Plastic Service Group

Operating Instructions

Temperature Controller Module

ETS 132 net

CE

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Translation of original
operating instructions

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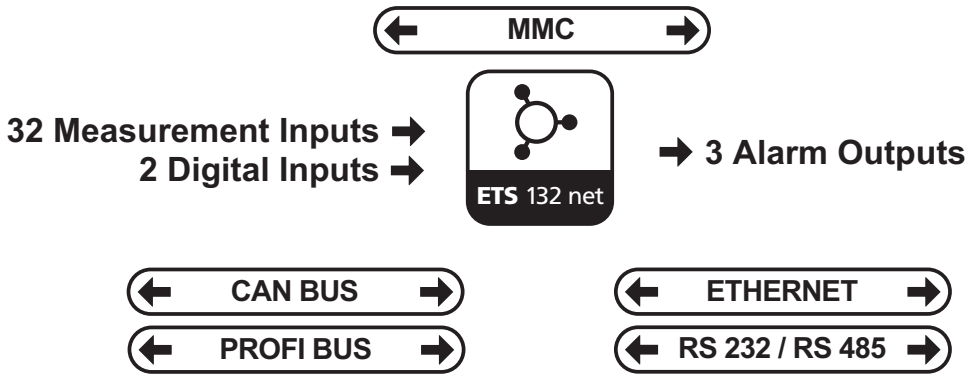
1 Introduction

Building on a common platform, the temperature control system sysTemp® net offers three different concepts for customized multi-zone temperature control.

The common platform of sysTemp® guarantees continuity with the configuration and parameterization, as well as with the connection over the available digital interfaces. Every controller can have up to four digital interfaces: RS485, CAN-Bus, Profibus DP and Ethernet.

The powerful and universal temperature controller module **ETS 132 net** is designed for employment in hot runner applications, machines for plastic processing, packaging machines, furnaces, foodstuffs processing, dryers, etc. With its adaptive parameter matching, it can be used in a wide field of With its adaptive parameter matching, it can be used in a wide field of application from extremely fast to extremely slow zones.

The ETS 132 net is based on a decentralized regulation concept, with which the actuating signals are guided to bus-capable output groups over the PSG actuator bus. The system is designed for 32 three-position zones.



The device is available in different implementations. This must be considered at installation and operational start-up. You find more detailed references to that in the chapter ↗Equipment implementation and ↗Electrical connection and operational startup.

These directions assist, both in case of the initial installation and operational startup of the device, and in case of changes and adaptations to existing control systems. Status and fault signals are described and remedial actions proposed for their removal.

The protocol descriptions for serial interface, CAN-Bus, Profibus DP & DPEA and Ethernet are not a component part of the operating manual. You are provided with these on request or directly as a download from the home page of PSG Plastic Service GmbH (www.psg-online.de).

1.1 Typographical conventions

Symbols and conventions are used in this manual for faster orientation for you.

Symbols

	Caution	With this symbol, references and information are displayed which are decisive for the operation of the device. In case of non-compliance with or inaccurate compliance there can result damage to the device or injuries to persons.
	Note	The symbol refers to additional information and declarations, which serve for improved understanding.
	Example	With the symbol, a function is explained by means of an example.
	Reference	With this symbol, information in another document is referred to.
↗		Cross references are marked with this character. In the pdf version of the document the objective of the cross reference is reached via the link.
`Equations`		Calculation specifications and examples are represented in this way.

1.2 Additional and continuative documents

	Protocol PSG II	Information on this topic are in the protocol description **PSG II** and the corresponding object lists.
	Protocol PSG II Ethernet	Information on this topic are in the protocol description **PSG II Ethernet** and the corresponding object lists.
	Protocol Profibus DP & Profibus DPEA	Information on this topic are in the protocol description **Profibus DP & Profibus DPEA** and the corresponding object lists.
	Protocol Modbus	Information on this topic are in the protocol description **Modbus** and the corresponding object lists.
	Protocol CANopen	Information on this topic are in the protocol description **CANopen** and the corresponding object lists.
	Data sheets and operating manuals	Available by Internet see www.psg-online.de

2 General Information

2.1 Guarantee conditions

This product is subject to the legal warranty time periods for faults or deficiencies in manufacture.

Content of the guarantee

If a malfunction relatively occurs through the manufacture, PSG Plastic Service GmbH repairs or replaces the non-conforming product, according to their own discretion.

The following repairs do not fall under the guarantee and liable to costs:

- Malfunctions after the legal notice periods have expired.
- Malfunctions caused through operating error of the user (if the device is not operated as described in the manual).
- Malfunctions caused through other devices.
- Changes or damage to the device which do not originate from the manufacturer.

If you wish to use services within the framework of this guarantee, please refer to PSG Plastic Service GmbH.

2.2 Installation and safety references

Before installation, actuation or operation of the device, please read through this operating manual completely and carefully.

This device corresponds to the European Directives for Safety and EMC. It is within the sphere of responsibility of the commissioning engineer to keep to these directives during the installation of the device.

CE marking

The device complies with the European Directives for electromagnetic compatibility (complies with EN 61326-1).

Service and repair

This device is maintenance free.

If the device should indicate a fault, please contact the manufacturer. Customer repairs are not permissible.

Cleaning

Employ no water or cleaning agents based on water for the cleaning of the device stick-on labels. You can clean the surface of the devices with a mild soap solution.

Storage

If you should not put the device into operation immediately after unpacking, protect it against moisture and coarse dirt.

Personnel

The installation of the device may by carried out by qualified personnel only.

Wiring

The wiring system must be implemented correctly according to the specifications in this operating manual. All feeds and connecting terminals must be dimensioned for the corresponding amperage. Furthermore, all connections are to be carried out according to the valid VDE Specification and/or the respective national specifications.

Ensure in particular that the AC power supply is not connected with the logic output or the low-voltage input.

Overload protection

Secure the power supply of the device and the relay output with a fuse protection or a power circuit-breaker. This protects the printed circuit boards against overcurrent.

Environment

Conducting contamination must not reach the proximity of the device connecting terminals in the control cabinet. In order to achieve suitable ambient air conditions, install an air filter in the air inlet of the control cabinet. If the

device should be in a condensing environment (low temperatures), install a thermostat-controlled heating unit in the control cabinet.

3 Equipment implementation

3.1 Type designation

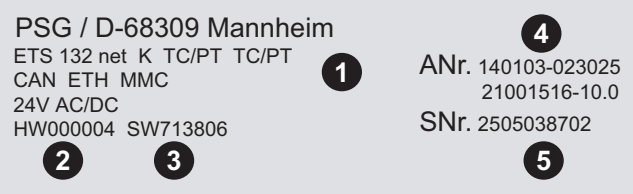
The equipment of the device, over and beyond the standard type, is stipulated with the order. The exact specification can be read off on the ↗Type designation plate type designation plate, which is on the carton, the casing and the printed circuit board.

The type designation identifies the equipment version and is composed of the options.

ETS132net		
Electrical connections	K FZ	Screwed terminal Spring terminal
Measurement inputs 1-8	TCPt U I	Thermocouple TC / resistance thermometer Pt100 Standardsignal U 0/2...10V Standard signal I 0/4...20mA
Measurement inputs 9-16	TCPt U I	Thermocouple TC / resistance thermometer Pt 100 Standardsignal U 0/2...10V Standard signal I 0/4...20mA
Measurement inputs 17-24	TCPt U I	Thermocouple TC / resistance thermometer Pt 100 Standard signal U 0/2...10V Standard signal I 0/4...20mA
Measurement inputs 25-32	TCPt U I	Thermocouple TC / resistance thermometer Pt 100 Standardsignal U 0/2...10V Standard signal I 0/4...20mA
Data interface 2	CAN CANopen	CAN-Bus with PSG-CAN pin assignment CAN-Bus with CANopen conform pin assignment
Data interface 3	- Profi	Not existing Profibus DP
Data interface 4	- ETH	Not existing Ethernet
OPTION MMC	- MMC	Not existing MultiMedia Card
Voltage	24 V	24 VAC/DC
Data interface 1 RS232 / RS485 is always existing as standard.		

3.1.1 Type designation plate

The following information can be taken from the type designation plate:



1 ↗Type designation
2 Revision identification of the printed circuit boards
3 Revision identification of the controller software
4 Order number
5 Serial number

3.2 Scope of delivery

- 1 Temperature Controller Module ETS132net
- 1 CD-ROM with full documentation and software

3.3 Accessories

Operation and display

BA operating and display unit
(Details, see data sheet)

Operator terminal BA Touch
Order number: 020 270

Output modules and power circuit-breakers

SMAO 04
Order number: 020 323

SMS 01
Order number: 020 332-5

CANSTI II P
Order number: 020 326

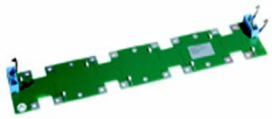
MAKL 24
Order number: 020 327

SMA 08
Order number: 020 310

MA 08
Order number: 000 000

SMV 04
Order number: 020 322

SSL 08
Order number: 020 311



SMS 02
Order number: 020 330

SMS 04
Order number: 020 331

SMR 02 / SMR 04
Order number: 020 320 / 020 321

Measured value recording

CANAIN 08
Order number: 020 365

Heating Current Monitoring

SSW 120P
Order number: 020 312-1

SUW
Order number: 020 315

CAN accessories

CANVTM 2K / 4K
Order number: 020 318 / 020 314-1

CANREP
Order number: 020 317

CANDAT
Order number: 020 349-1

Software / Online maintenance

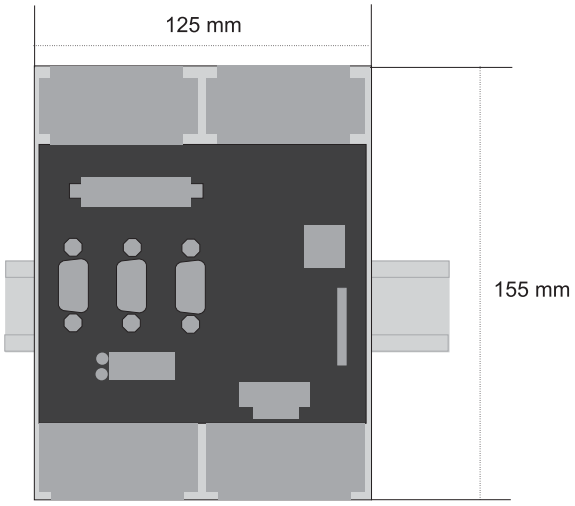
WinKonVis
Order number: 039 020

WinKonVis Server
Order number: 039 021

webremote
Order number: 020 346

4 Device construction

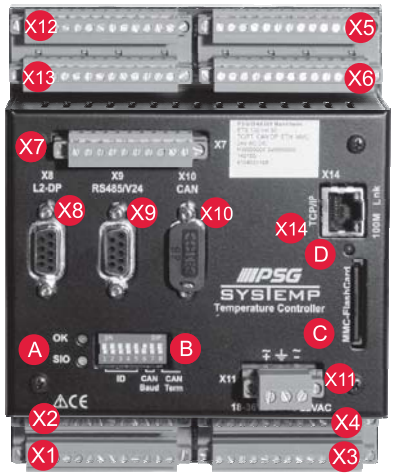
4.1 Dimensions



The ETS132net has a securing mechanism for the installation on DIN rail (DIN 50022) see ↗Installation/Dismantling.

4.2 Connection overview

The connection overview here indicates all possible connection variants.
The actual connection overview depends on the ↗Equipment implementation which is stipulated with the order.



ETS132net

X1/X2	Measurement inputs 1...8
X3/X4	Measurement inputs 9...16
X5/X6	Measurement inputs 17...24
X7	Alarm outputs 1...3, digital inputs 1...2
X8	OPTION Profibus DP
X9	RS485/ V24
X10	CANBus
X11	Power supply
X12/X13	Measurement inputs 25...32
X14	OPTION Ethernet
A	Status LED's
B	DIP switch
C	OPTION MultiMedia Card MMC
D	Status LED MultiMedia Card MMC

4.2.1 Status LED's

The SIO-LED (yellow) signalizes the interface operation and flashes quicker or slower due to the amount of data.
In the normal case the OK-LED (green) on the front panel of the controller lights up permanently.
The LED flashes if there is a fault. The cause of error can be read off on the basis of the number of flashing signals. Detailed information about the error cause can be referred to in the chapter ↗System errorand ↗Summary of system errors / flashing codes OK-LED

4.2.2 DIP switch

Detailed information on the function of the DIP switches are in the chapter ↗Addressing and Further Functions by DIP Switch

4.2.3 Status LED MultiMediaCard MMC

Detailed information on the function of the MMC can be referred in the chapter ↗MultiMedia Card MMC

5 Installation/Dismantling

ESD Avoidance

To avoid ESD damages the device must be handled, packed, unpacked and stored in an especially protected environment (Electrostatic Protected Area, EPA). An ESD-protected work environment conducts existing electrostatic charges to ground in a controlled manner and prevents their re-occurrence.

Unpacking

The device is packed fully-mounted in a robust carton, cushioned with foamed material.

Check the packaging and then the device for identifiable damage incurred during transit. If damage is identified, then please get in touch with the transportation company.

In the case of damage the device may not be brought into operation.

Ensuring voltage-free state

Before beginning and during all installation/dismantling work, attention is to be paid that the system, as well as the devices, are de-energized

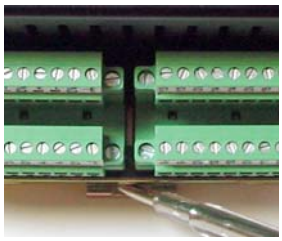
Installation location

A device of the protection type IP20 is to be installed in a closed control cabinet.

Securing

The device has a securing mechanism for installation on a DIN rail (DIN 50022).

Installation/Dismantling



The device is initially suspended in the DIN rail with the two straps (rear/middle side) and then latched in. For dismantling, the unlocking mechanism on the front below at the device (Illustration) is to be screwed down with a screwdriver and the device taken out towards the front/above.

Device exchange

Only controllers of similar type may be exchanged. In case of replacement, it is absolutely necessary to adopt the setting adjustments of the replaced controller.

6 Electrical connection and operational startup

The ETS132net may be installed and put into operation by specialist personnel only.
Before switch-on of the control zones it is to be ensured that the ETS132net is configured for the application. An incorrect configuration can lead to damage to the control section or to injuries to persons.

6.1 Connection type

In the standard type the device is equipped with screwed terminals. The terminals existing on the device are to be taken from the ↗Type designation
The following plugs of the Co. Phoenix are employed for the individual connections:

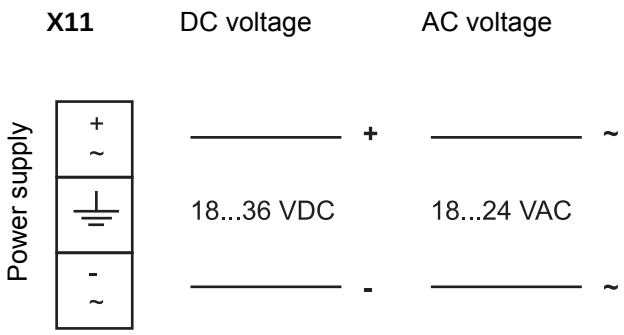
Connection	Type designation Plug for screwed terminal	Type designation OPTION Plug for spring terminal
X1...X6, X12...X13	MCVR 1.5/13-STF-3.81	FK-MCP 1.5/13-STF-3.81
X7	MCVR 1.5/10-STF-3.81	FK-MCP 1.5/10-STF-3.81
X11	MVSTBW 2.5 HC/3-STF-5.08	FKC 2.5 HC/3-STF-5.08

The wiring system is implemented on the screwed terminals and spring terminals with the appropriate cable lugs. Cables with a cross section of 0.5 to 1.5mm^2 can be employed.

The terminal marking was modified. Here you find the new/old (identified by **NEW/OLD**) terminal marking described.

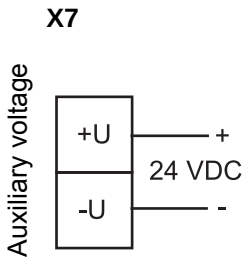
6.2 Connector assignment and basic configuration

6.2.1 Power supply (Connection X11)



Power consumption	Max. 25 VA on load
Fuse protection	External device fuse protection 4 A time-delay

6.2.2 Auxiliary voltage (Connection X7)



Do not ground externally!

Output current	max. 1.5 A

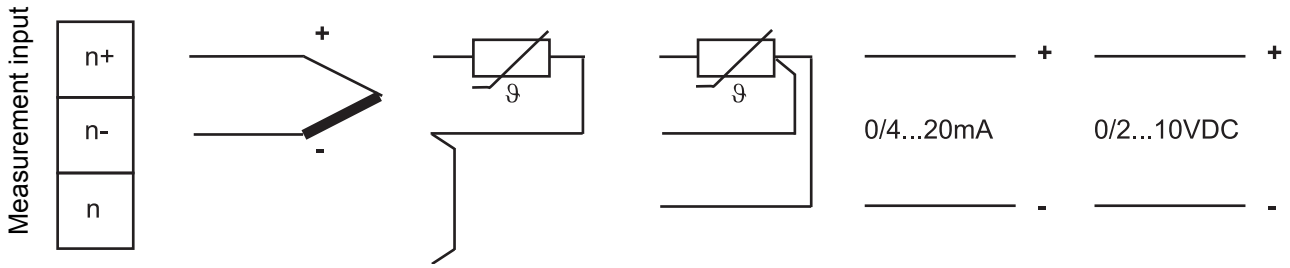
6.2.3 Measurement inputs (Connection X1 to X6 and X12/X13)

The measurement inputs are stipulated in groups of eight (1...8, 9...16, 17...24, 25...32). The measurement inputs occupy 3 connections per input

PIN	X1 NEW	X2 NEW	X3 NEW	X4 NEW	X5 NEW	X6 NEW	X12 NEW	X13 NEW
1	1+	5+	9+	13+	17+	21+	25+	29+
2	1-	5-	9-	13-	17-	21-	25-	29-
3	1	5	9	13	17	21	25	29
4	2+	6+	10+	14+	18+	22+	26+	30+
5	2-	6-	10-	14-	18-	22-	26-	30-
6	2	6	10	14	18	22	26	30
7	3+	7+	11+	15+	19+	23+	27+	31+
8	3-	7-	11-	15-	19-	23-	27-	31-
9	3	7	11	15	19	23	27	31
10	4+	8+	12+	16+	20+	24+	28+	32+
11	4-	8-	12-	16-	20-	24-	28-	32-
12	4	8	12	16	20	24	28	32
13	⏚	⏚	⏚	⏚	⏚	⏚	⏚	⏚

PIN	X1 OLD	X2 OLD	X3 OLD	X4 OLD	X5 OLD	X6 OLD	X12 OLD	X13 OLD
1	1+	5+	9+	13+	17+	21+	25+	29+
2	1-	5-	9-	13-	17-	21-	25-	29-
3	0V	0V	0V	0V	0V	0V	0V	0V
4	2+	6+	10+	14+	18+	22+	26+	30+
5	2-	6-	10-	14-	18-	22-	26-	30-
6	0V	0V	0V	0V	0V	0V	0V	0V
7	3+	7+	11+	15+	19+	23+	27+	31+
8	3-	7-	11-	15-	19-	23-	27-	31-
9	0V	0V	0V	0V	0V	0V	0V	0V
10	4+	8+	12+	16+	20+	24+	28+	32+
11	4-	8-	12-	16-	20-	24-	28-	32-
12	0V	0V	0V	0V	0V	0V	0V	0V
13	⏚	⏚	⏚	⏚	⏚	⏚	⏚	⏚

X1 to **X6,** **X12, X13**	Thermocouple TC	Resistance thermometer Pt100 2-wire	Resistance thermometer Pt100 3-wire	Standard signal I	Standard signal U



The specifications apply for all measurement inputs.

The implementation of the measurement inputs is to be indicated with the order. The possible combinations are to be taken from the ↗Type designation.

Configuration on operational startup

Arrange sensor type for the measurement inputs.	↗[SP18] SEN1/SEN1 - Sensor Type Zone 1...8 ↗[SP19] SEN2/SEN2 - Sensor Type Zone 9...16 ↗[SP20] SEN3/SEN3 - Sensor Type Zone 17...24 ↗[SP21] SEN4/SEN4 - Sensor Type Zone 25...32
Stipulate offset valid for all zones.	↗[P033] OFFS/OFFS - Temperature Offset
Stipulate offset valid for the corresponding zones.	↗[SP28] OFF1/OFF1 - Offset Zone 1...8 ↗[SP29] OFF2/OFF2 - Offset Zone 9...16 ↗[SP30] OFF3/OFF3 - Offset Zone 17...24 ↗[SP31] OFF4/OFF4 - Offset Zone 25...32
Stipulation of the measuring range, when measurement input is of the standard signal type.	↗[P047] ANZ-/RG L - Lower Temperature Level at Standard Signal Inputs ↗[P048] ANZ+/RG - Upper Temperature Level with Standard Signal Inputs
Stipulate units of all measured values.	↗[SP22] CELS/CELS - Temperature Unit °C/°F
Specification of the measuring channel, if measured value comes from a FIN 08 or CANAIN08 over CAN-Bus.	↗[P057] NrIW/NoZN - Zone Allocation to Measurement Input on Sensor Interface FIN

6.2.4 Control outputs on bus-capable output groups

The ETS 132 net is based on a decentralized regulation concept, where the actuating signals are routed over the PSG actuator bus onto bus-capable output groups (see ↗Accessories). The allocation of the control zones is configurable with the engineering tool WinKonVis.

The procedure for the project setup of the control outputs is described fully in the direction "Project set-up of an ETS control system".

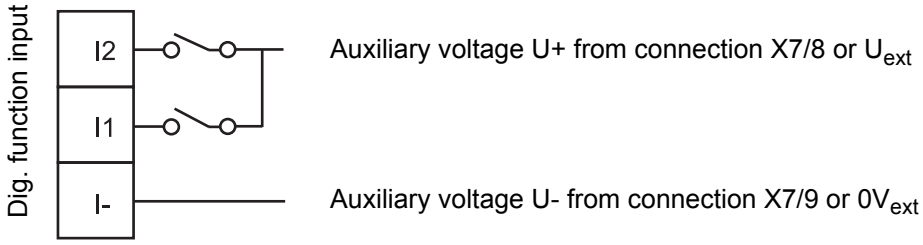
6.2.5 Digital inputs (Connection X7)

The digital inputs are realized with optocouplers. The standard device is designed with 2 digital function inputs (at Connection X7) .

The digital function inputs, as well as the digital inputs, work with functions fixed stored in the controller, which are defined by the system setting.

PIN	X7 NEW	X7 OLD	Description
1	I2	IN2	Dig. function input 2
2	I1	IN1	Dig. function input 1
3	I-	IN-	Reference potential I *

X7



The specifications apply for all digital inputs

Rated voltage	30VDC
Power requirement	approx. 5mA

Configuration

Stipulate function which is implemented on activation/deactivation of the two digital inputs on plug X7.	↗[SP23] INP1/INP1 - Function Digital Input 1 ↗[SP24] INP2/INP2 - Function Digital Input 2

6.2.6 Digital outputs (Connection X7)

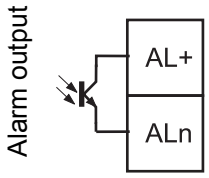
The digital outputs are realized with optocouplers. The standard device is designed with 3 alarm outputs (at connection X7) .

In the system setting it is defined which alarms are output on the outputs .

PIN	X7	Description
4	AL 3	Alarm Output 3
5	AL2	Alarm Output 2
6	AL1	Alarm Output 1
7	AL+	Supply voltage for alarm outputs

Terminal marking OLD=NEW

X7



Auxiliary voltage U+ from X7/8 or U_{ext}

Auxiliary voltage U- from connection X7/9 or $0V_{ext}$. The specifications apply for all digital outputs.

Rated voltage	30VDC
Rated output current	<= 60mA
	Inductive load only with external free-wheeling diode

Configuration

Stipulate function of the alarm output 1.	↗[SP08] A1D1/A1D1 - Definition Byte 1 - Alarm Output 1 ↗[SP09] A1D2/A1D2 - Definition Byte 2 - Alarm Output 1 ↗[SP10] A1D3/A1D3 - Definition Byte 3 - Alarm Output 1
Stipulate function of the alarm output 2.	↗[SP11] A2D1/A2D1 - Definition Byte 1 - Alarm Output 2 ↗[SP12] A2D2/A2D2 - Definition Byte 2 - Alarm Output 2 ↗[SP13] A2D3/A2D3 - Definition Byte 3 - Alarm Output 2
Stipulate function of the alarm output 3.	↗[SP14] A3D1/A3D1 - Definition Byte 1 - Alarm Output 3 ↗[SP15] A3D2/A3D2 - Definition Byte 2 - Alarm Output 3 ↗[SP16] A3D3/A3D3 - Definition Byte 3 - Alarm Output 3
Stipulate which alarms are calculated if zone is passivated.	↗[P051] ALP1/ALP1 - Alarm Calculation 1 with Passive Zones ↗[P052] ALP2/ALP2 - Alarm Calculation 2 with Passive Zones

6.2.7 Data interface RS232/RS485 (Connection X9)

The standard device is designed with the serial RS232/RS485 data interface.

RS232

PIN	X9
1	n.a.
2	n.a.
3	TxD-V24
4	n.a.
5	n.a.
6	n.a.
7	n.a.
8	RxD-V24
9	GND-V24

Indirect coupled.

Only for purpose of configuration.

RS485

PIN	X9
1	TxD-P
2	TxD-N
3	n.a.
4	n.a.
5	RxD-N
6	RxD-P
7	n.a.
8	n.a.
9	n.a.

Indirect coupled.

2/4-wire.

In the case of 2-wire operation:

Connect Pin 1 and 6,

as well as Pin 2 and 5.

The communication over serial data interface uses the protocol PSGII and Modbus. You are provided with a protocol description PSGII and Modbus (addressing, protocol frame, logging function) and the respective object list (zone and system parameters, which are stored for the controller type in the protocol) of the device, as a download, on request, or directly from the home page of PSG Plastic Service GmbH (www.psg-online.de).

Configuration

The configuration of the communication over the serial data interface is implemented with the aid of the parameters listed under ↗Serial data interface.

6.2.8 CAN Bus (connection X10)

The options included in the device are to be taken from the ↗Type designation.

PIN	X10 PSG-CAN
1	+U
2	n.a.
3	n.a.
4	n.a.
5	GND
6	n.a.
7	CAN-L
8	n.a.
9	CAN-H

PIN	X10 CANopen
1	n.a.
2	CAN-L
3	n.a.
4	n.a.
5	n.a.
6	n.a.
7	CAN-H
8	n.a.
9	n.a.

The communication over the CAN Bus uses the protocol CANopen. You are provided with an object list (zone and system parameters which are stored for the controller type in the protocol) of the device, as a download, on request, or directly from the home page of PSG Plastic Service GmbH (www.psg-online.de).

Configuration

The configuration of the communication over the CAN Bus interface is implemented with the aid of the parameters listed under ↗CANBUS

6.2.9 OPTION Profibus DP (Connection X8)

The options included in the device are to be taken from the ↗Type designation.

PIN	X8
1	n.a.
2	n.a.
3	TxD-B
4	RTS
5	0V
6	+5VDC
7	n.a.
8	TxD-A
9	n.a.

The communication over the Profibus DP data interface uses the Profibus protocol DP and Profibus DP/EA. The system parameter **DPEA** switches between the protocols (DPEA = ON = Profibus DP/EA).

You are provided with a protocol description Profibus DP and Profibus DP/EA (addressing, protocol frame, logging function) and the respective object list (zone and system parameters, which are stored for the controller type in the protocol) of the device, as a download, on request, or directly from the home page of PSG Plastic Service GmbH (www.psg-online.de).

Configuration

The configuration of the communication over the Profibus interface is implemented with the aid of the parameters listed under Profibus DP.↗Profibus DP

6.2.10OPTION Ethernet (Connection X14)

The options included in the device are to be taken from the ↗Type designation.

PIN	X14
1	Tx+
2	Tx-
3	Rx+
4	n.a.
5	n.a.
6	Rx-
7	n.a.
8	n.a.
9	n.a.

The Ethernet controller of the controller has four ports. The adjustment of the port number is not variable:

- Three ports 80 (HTTP) for direct access to the web interface of the controller over web browser.
- One port 5678 for access over WinKonVis and/or WinKonVis Server.

A port sharing is not possible. This means:

- Repeated simultaneous access over browser (HTTP) or over server WinKonVis/WinKonVis to the controller is not possible.
- Simultaneous access to the controller over browser (HTTP) and server WinKonVis/WinKonVis is possible, also from different PC's.

You are provided with a protocol description Ethernet (addressing, protocol frame, logging function) and the respective object list (zone and system parameters, which are stored for the controller type in the protocol) of the device, as a download, on request, or directly from the home page of PSG Plastic Service GmbH (www.psg-online.de).

You are provided with a protocol description Ethernet (addressing, protocol frame, logging function) and the respective object list (zone and system parameters, which are stored for the controller type in the protocol) of the device on request.

6.2.10.1 PSG Script

In the case of the controllers of the design series sysTemp® net, HTML pages, self-defined by the user, as well as fixed programmed into the firmware, can be called up over browser if the Ethernet interface is available. With the definition of HTML pages, the user is supported by the function PSG Script. In this function, special tags have been defined in order to be able to represent process and configuration data of the controller within a HTML document or to call up functions. With the processing of the HTML document, the tag is correspondingly replaced through value representations and/or entry fields or function calls. The self-defined HTML pages are stored on the MMC (↗OPTION MultiMedia Card MMC must be included).

You can find full information in the separate description for PSG Script.

Configuration

The configuration of the communication via Ethernet is implemented with the aid of the parameters listed under ↗Ethernet

6.2.11OPTION MultiMedia Card MMC

The options included in the device are to be taken from the ↗Type designation.

The controllers of the design series sysTemp® net can be optionally equipped with a slot for a MultiMedia Card (MMC).

- Firmware update
- Direct loading or storage of 10 controller settings
- Direct loading or storage of 10 DIP switches dependent controller settings
- Transfer of WinKonVis projects into the controller by MMC
- Project-related input of controller configurations on MMC in the WinKonVis format

Project-related writing of controller configurations of MMC

- Representation of user HTML pages stored on MMC (↗OPTION Ethernet (Connection X14))

Detailed information on the function of the MMC can be referred in the chapter ↗MultiMedia Card MMC

7 Addressing and Further Functions by DIP Switch

Using the DIP switch, the following configuration of the system and functions like acknowledgement can be carried out.

DIP 1...5 **Device ID/ Addressing**

Device ID is enciphered in binary form and is set adjusted over the DIP switches 1...5.
The device address is composed as follows for the individual interfaces:

PSGII Address = Device ID, see ↗[SP33] ADRT/ADRT - Addressing Type

Modbus Modbus Zone addressing, see protocol description

CAN-Bus Address = CAN-Bus base address + Device ID

CAN-Bus base address: 32, Device ID: 2 > > > Address 34
see ↗[SP05] CADR/CADR - CANopen Base Address

Profibus DP Address = Profibus DP base address + Device ID

Profibus DP base address: 30, Device ID: 2 > > > Address 32
see ↗[SP07] DPAD/DPAD - Profibus DP Slave Address

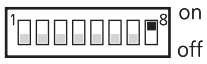
Ethernet Ethernet address = 4th octet of the IP base address + Device ID

IP base address: 198.168.0.0, Device ID: 2 > > > Address 198.168.0.2
see ↗[SP49] IP4 /IP4 - IP Address of 4th Octet

DIP 6...7 **Baud rate CAN**

DIP6	DIP7	Baud rate CAN
OFF	OFF	78.8 kBit
ON	OFF	250 kBit
OFF	ON	500 kBit
ON	ON	125 kBit

DIP 8 **CAN bus termination**



DIP 8 ON activates the internal CAN-Bus terminating resistor of 120 ohms.

DIP 1...7 **Standard setting**

If the DIP switches 1...7 = ON, the following default settings are activated

Default setting serial data interface (X9):
Device ID = 0
Protocol PSGII
Baud rate 19200 Baud
No Parity
1 Stop bit

Ethernet interface default setting (X14):
- IP Address 192.168.0.200

DIP 1...8 **Acknowledge error report**

By setting all 8 DIP switches to ON and thereafter to the pervious setting, the acknowledgement of pending error messages is initiated.

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8 Status displays/diagnostics

8.1 Information 'zone text'

In case of certain operational states of the controller, a text is overlaid alternately with the actual value in the zone display of the operating and display units. This text can be read out under the byte ZoneFMode for every zone over all interfaces. The information is also designated as a zone text.

Since only the zone text with the highest priority can always be displayed, the zone text is to be considered exclusively as an extension to the status information of a zone. The byte ZoneFMode includes the following information:

Bit	on	off
0...5	Zone text ↗Overview of zone texts	
6	Control zone has correct model of the control zone. At least a ↗[P035] IDEN/IDEN - Heating Identification has been successfully carried out.	Control zone does not have any correct model of the control zone. No ↗[P035] IDEN/IDEN - Heating Identification has yet been successfully carried out.
7	Zone active.	Zone passive.

8.1.1 Overview of zone texts

Signal flag (dec)	Display	Meaning	Alarm	Status
1	Ma	Manual mode		x
2	CoU	Leading zone manual mode		x
3	AbS	Reduction		x
4	rAP	Temperature Ramp		x
5	StA	Startup operation		x
6		Without function		
7	Id	Identification		x
8	IdC	Cooling adaptation		x
9	tCb	Sensor break	x	
10	FAL	Sensor short-circuit	x	
11	tcP	Sensor incorrect polarity	x	
12	CAn	Fault in CAN communication	x	
13	Err	System error/ fault in channel data	x	
14	AL	Exceeded maximum temperature/ upper limit of measuring range	x	
15	Pld	Plausibility violation during the identification		x
16	drl	Drift error report during identification phase		x
17	IF	Error report "No heating current measured" during identification phase	x	
18	SP2	2nd setpoint value		x
19	SP3	3rd setpoint value		x
20	SP4	4th setpoint value		x
21	dF1	Fault "No current" determined in case of "Heating current" diagnostics	x	
22	dF2	Fault "Current on incorrect zone" determined in case of "Heating current" diagnostics		x
23	dF3	Fault "Current both on correct as well as on another zone" determined with "Heating current" diagnostics		x
24	dE	No fault determined with "Heating current" diagnostics / "Allocation sensor/ heating" diagnostics ends		x
25	dIA	Diagnostics function active		x
26	dF4	Fault "Alarm current with switched off heating" determined in case of diagnostics		x
27	Ar	Automatic ramp		x
28	Ar.	Automatic ramp active, zone with least temperature rise		x
29	I-	Alarm "Current alarm with heating off"	x	
30	ALS	Storing alarm function	x	
31	IdS	Automatic cooling adaptation started, however still not active		x
32	GP	Zone waits for group release		x
34	000			
35	001	Error signal	x	
36	002	Module matching system error	x	
37	003	CPU adjustment fault	x	
38	004			
39	005	Fault in system data	x	

Signal flag (dec)	Display	Meaning	Alarm	Status
40	006			
41	007			
42	008	Switch-on configuration	x	
43	009	Switch-on configuration sensor	x	
44	010	Read MMC error	x	
45	011	Write MMC error	x	
50	Out	Power controller disconnected (Digital Input 2 active and system parameter INPD equal to 0 or 1)		x
51	CuI	CAN error in data link controller/CANSTI	x	
52	ArE	Automatic ramp fault	x	
53	ArE.	Automatic ramp fault, zone with least rate of rise	x	
54	GPO	Bypass group release		x
55	GPA	Reduce group release		x
56	LdF	HEX update function and/or formatting released by MMC		x

8.2 System error

Unlike zone-specific faults (temperature limit values, heating current alarms, etc.) system errors identify faults on the controller itself. The system errors can be read out from the controller on the zone flags over all interfaces. Detailed information on this can be found n the object lists for the corresponding protocols.

The cause of error, the output of the OK-LED on the controller, the message text in the operating and display units, as well as notes on the elimination of the fault, are indicated below for all possible system errors.

Fault in the CPU basic matching

If the basic matching of the controller cannot be read correctly any longer, then the bit "Fault in the basic matching" is set.

- On all zones of the controller a degree of operation of 0% is output.
- On the OK-LED of the controller a flashing signal is output.
- With the operating and display units, ERR 003 is displayed.

For the removal of the fault, the controller is to be set to the ex-works state (Code Number 759). Before resetting into the ex-works state, please note down all channel data and system dates or read out and store with WnKonVis.

Fault in the module matching

The module matching data items in the controller unit . If these cannot be read correctly any longer, then the bit "Fault in the module matching" is set.

- On all zones of the module, a degree of operation of 0% is output
- If a "fault in the module matching" is identified for the zones 1 to 8, then two flashing signals are output at the OK-LED of the controller.
- If a "fault in the module matching" is identified for the zones 9 to 16, then three flashing signals are output at the OK-LED.
- If a "fault in the module matching" is identified for the zones 17 to 24, then four flashing signals are output at the OK-LED.
- If a "fault in the module matching" is identified for the zones 25 to 32, then five flashing signals are output at the OK-LED.
- With the operating and display units, ERR 002 is displayed.

For the removal of the fault, the controller is to be set to the ex-works state (Code Number 759). Before resetting into the ex-works state, please note down all channel data and system dates or read out and store with WnKonVis.

Fault in channel data

For the assurance of the data consistency and the data security, a checksum is stored for every zone in case of storage of the configuration data into the EEPROM.

The bit „Fault in channel data“ is activated, when the controller detects a check sum error during reading of channel data.

- If a "Fault in channel data" is identified, seven flashing signals are output on the OK-LED.
- With the operating and display units, ERR is displayed in the zone display.

For the removal of the fault, all zone-specific configuration parameters are to be checked, a value changed and the change stored in the EEPROM. After this, wait 20 seconds and carry out a controller reset (e.g. over code number 999). After the regulator restart, the fault should have disappeared.

Alternatively, the controller can be set into the ex-works state (Code Number 759). Before resetting into the ex-works state, please note down all channel data and system dates or read out and store with WinKonVis.

If the fault reappears after the reset, then there is a hardware fault in the EEPROM. The controller must be sent in for repair.

Fault in System data/ Attributes

The system data is stored grid-failure-secure in the EEPROM of the controller. The bit "Fault in system data/attributes" is set if data change without external intervention.

- On all zones of the controller a degree of operation of 0% is output.
- If a "Fault in system data/attributes" is identified, then six flashing signals are output on the OK-LED.
- With the operating and display units, ERR 005 is displayed.

For the removal of the fault, all system data and attributes are to be checked, a value changed and the changes taken over into the EEPROM. After this, wait 20 seconds and carry out a controller reset (e.g. over code number 999). After the regulator restart, the fault should have disappeared.

Alternatively, the controller can be set into the ex-works state (Code Number 759). Before resetting into the ex-works state, please note down all channel data and system dates or read out and store with WnKonVis.

If the fault reappears after the reset, then there is a hardware fault in the EEPROM. The controller must be sent in for repair.

CAN-Bus fault

A fault CAN-Bus occurs, for example, when data which should be received by the controller over CAN-Bus controller (e.g. measured values of FIN 08 or CANAIN 08) does not reach the controller or CAN components corresponding to the controller (e.g. CANSTI) cannot be identified by the controller.

- In case of a fault on the CAN-Bus, eight flashing signals are output on the OK-LED.
- In case of the operating and display units, CAN is displayed in the zone displays.

For elimination of the fault all cable connections, settings of CAN baud rate, address settings have to be checked.

Detailed information on the error location (among other things) can be found in the planning instructions of an ETS control system. You are provided with the document, on request, or directly as a download from the home page of PSG Plastic Service GmbH (www.psg-online.de).

8.2.1 Summary of system errors / flashing codes OK-LED

Cause of error	Number of flashing signals	Display of operating and display units
Fault in the CPU basic matching	1	ERR 003
Fault in the module matching Zone 1 to 8	2	ERR 002
Fault in the module matching Zone 9 to 16	3	ERR 002
Fault in the module matching Zone 17 to 24	4	ERR 002
Fault in the module matching Zone 25 to 32	5	ERR 002
Fault in EEPROM		ERR 004
Fault in system data/ Attributes	6	ERR 005
Fault sensor type (A sensor type is adjusted for the device, that is not supported by the device/calibration. The error report can be acknowledged (see ↗Addressing and Further Functions by DIP Switch). Check the setting of the sensor type after acknowledgement.		ERR 009
Fault in channel data	7	ERR
CAN-Bus fault	8	CAN

8.3 Diagnostic function (code number 600) - Allocation of Sensor and Heating

The controller has a complex automated function to check the allocation of sensors and Heating. The function checks, whether sensors and Heating are allocated and wired correctly.

The function uses the configuration parameter ↗[P032] AFZ4/STT4 - Start-up Time of 4. Set Point/4. Lowering Value. By this, a zone specific testing period is specified. The testing period defines the time, the zone should react on a trigger by the degree of operation.

For an optimal diagnostic process, the diagnostic function should be executed, when the control zones are in cold condition.

- Specify a setpoint value for the zone that is smaller than the actual value
- Check the configuration parameter ↗[P032] AFZ4/STT4 - Start-up Time of 4. Set Point/4. Lowering Value
- Passive zones are not included in the diagnostics

The diagnostic function is basically executed until the end, even when errors are recognized. It is only interrupted, when a temperature rise for a degree of operation = 0% is detected, i.e. the actuator is defective, what can lead to an overheating of the control zone.

The check routine is started by entry of code number 600 and runs in two phases.

Phase 1: Complete Check of all Zones together

In phase 1 the degree of operation

- of all active zones,
- whose setpoint value is greater than 0°C

is set to 0% and all actual value are monitored. Using the operating and display unit BA, in the zone display of the zones, relevant for diagnostic process, the message **dIA** is output. The zone display for the other zones is dimmed. The corresponding information can be requested by message flag ZoneFMode by interface.

Rises the actual value of any zone at least 5°C in between the testing period, in the zone display for this zone **dE** and **888** is displayed alternately and the check routine is completely stopped. The stopped check routine must be acknowledged by code number 602.

Phase 2: Single Check

After termination of phase 1 (takes as long, as the maximal specified value for ↗[P032] AFZ4/STT4 - Start-up Time of 4. Set Point/4. Lowering Value)

a single check of each zone, consecutive for each zone, is started.

For this, the degree of operation of one zone is set to 100% and monitored, whether a temperature rise of 5°C in between the specified testing period ↗[P032] AFZ4/STT4 - Start-up Time of 4. Set Point/4. Lowering Value is detected. Using the operating and display unit BA, in the zone display the message dIA is output.

After termination of the single check for all zones, the diagnostic result is immediately displayed in the zone display for the relevant zones. Alternately **dE** (DiagnosticResult) and a number are displayed, where the diagnostic result could easily be deduced.

Message BA at Diagnostic End		Meaning
dE	0	Zone OK
dE	1_32	The sensor to this zone is wrongly connected to channel x
dE	- 1_-32	The sensor to this zone is wrongly connected to channel x and with reversed polarity
dE	999	Sensor break
dE	888	Temperature rise in spite of degree of operation 0%
dE	≡ 777	No temperature rise during diagnostic period detected

The status of diagnostics of the zone can be requested by message flag ZoneFMode (for PSGII protocol offset 0x60).

Value of message flag ZoneFMode [1…5]	active = 25(dec)
Value of message flag ZoneFMode [1…5]	Diagnostics ended = 24 (dec)

(↗Information 'zone text')

When the diagnostics is terminated, the diagnostic result could additionally be requested by offset 0x6B (PSGII protocol), which has the same value like the message in the zone display of the operating an display unit BA.

After termination of the diagnostics the check routine must be acknowledged by code number 602. With the same code number the check routine can be stopped.

8.4 Diagnostic function (Code Number 601) - Start Current Measurement

After entry of the code number 601, a complex routine for an automated check of the allocation of "Heating/Current transformer" is started. The routine checks whether the feed lines for the Heating is led through the corresponding current transformer.

After start of the function, **dIA** is displayed in the zone displays, when the operating and display unit BA is used. The corresponding information can be requested by message flag ZoneFMode by interface.

The following messages could result out of the diagnostic function.

Message	Meaning
dF1	No current was detected
dF2	A current was detected on another zone
dF3	A current was detected on the right and on another zone
dF4	A current was measured, although no current should be detected
dE	Zone OK

8.5 Manual Activation of a Current Measurement (Code Number 41)

After entry of code number 41 in the process of cyclic current measurement (↗[SP25] ADEF/AMPD - Heating Current Measurement Method <> 0) a current measurement is once triggered.

The current measurement is initiated by sending the code number 41. The code number is transferred (ca. 1 second).

Only for protocol Profibus DPEA the code number 0 must be send afterwards [Reset of data exchange buffer].

Wait for the end of the current measurement (at least 8 seconds), the alarm analysis follows. The cyclic current measurement runs afterwards normal.

9 Configuration and adjustments

With the configuration parameters, zone (and/or channel) parameters and system parameters are distinguished between. Zone parameters are separately adjustable for every zone of the controller, while system parameters apply zone-independently for the entire controller.

Parameters are functionally collated in the description. The identification of a parameter is implemented over the following:

- the **designation** of the configuration parameter as zone [P***] and/or system parameter [SP**],
- a **characteristic analog** for the identification of the parameter in the parameter lists of the project planning and configuration tool WinKonVis
- The **parameter mnemonics** (German/English), which are employed for the identification in the operating and display units BA and in the project planning and configuration tool WinKonVis (WKV),

- the **parameter label**,
- the data type (Bit, Byte, Char, Word, Integer) and bytes occupied by the data type
- the setting range over the interfaces and over the operating and display units BA (if these are identical, the setting range is indicated only once) and a multiplication factor that is to be considered.
- a unit (when existent)

- The ex-works basic setting of a parameter is identified through a bracket (e.g. [on]).
- The handling of, as well as the access to, the parameters over the data interfaces (serial interface [PSGII, MODBUS], CAN-Bus, Profibus DP [Standard, DPEA], Ethernet) are to be taken from the protocol descriptions, as well as from the relevant parameter object lists.
- The maximum setting range of a parameter is stipulated through its data format. In general, the maximum possible setting range is functionally limited. This is indicated as a setting range for the interfaces.
- The detailed information on the data formats and ranges of values of the parameters are also to be found in the object lists to the interfaces.

9.1 Basic configuration

[P055] ZONE/ZONE - Zone

Data type	Bit
Adjustment range interfaces	1, [0]
Adjustment range BA	off, [on]

For reasons of compatibility to PSG controllers of older generations, the adjustment value is over interface in reverse logic.

1	off	■ At control output in accordance with operating mode (control/manual mode) actuating signals are output. ■ All alarms are calculated.
[0]	[on]	■ At control outputs no actuating signals are output. ■ Only those alarms are calculated which are released in the parameters ↗[P051] ALP1/ALP1 - Alarm Calculation 1 with Passive Zones and ↗[P052] ALP2/ALP2 - Alarm Calculation 2 with Passive Zones.

[P038] KHLG/COOL - 3-Point Operation

Data type	Bit
Adjustment range interfaces	0, [1]
Adjustment range BA	off, [on]

0	off	The control algorithm works in two-point operation (heating). The output range of the degree of operation in control and manual mode is 0...100%. At the heating control output, actuating signals are output at positive setting levels, at the cooling output no actuating signal is output.
[1]	[on]	The control algorithm works in three-position operation (heating/cooling). The output range of the degree of operation in control and manual mode is -100...100%. On the heating control output, actuating signals are output at positive setting levels and, on the cooling output the actuating signals are output at negative setting levels

[SP22] CELS/CELS - Temperature Unit °C/°F

Data type	Char
Adjustment range interfaces	0, [1]
Adjustment range BA	°F, [°C]

Unit of measurement signal.
The measured value is calculated directly in case of controllers with thermo-element and resistance thermometer inputs. In case of controllers with standard signal inputs, the calculation is implemented on the basis of the scaling parameters ↗[P047] ANZ-/RG L - Lower Temperature Level at Standard Signal Inputs and ↗[P048] ANZ+/RG - Upper Temperature Level with Standard Signal Inputs

[SP38] MAXK/MAXC - Maximum Number of Channels

Data type	Byte
Adjustment range interfaces/ multiplier	1...[32] / 1
Adjustment range BA	1...[32]

The parameter stipulates the zone number for which the regulation, as well as the alarm handling, is processed, starting from the first zone. The reduction of the zone number does not have any effect on the cycle duration in case of recording of the measured values.

9.2 Configuration inputs

[SP18] SEN1/SEN1 - Sensor Type Zone 1...8

Data type	Byte
Adjustment range interfaces/ multiplier	[0]...255 / 1
Adjustment range BA	[FeL], FeJ, NiC, Pt, Str, Ni

The parameter stipulates the type of the sensors which are connected to the measurement inputs of the corresponding zones.

- In case of controllers in the implementation TCPt, all eight measurement inputs can be switched over between thermo-element types (Fe CuNi L, Fe CuNi J, Ni CrNi K, NiCriSi NiSi N) and resistance thermometers (Pt100, Ni100).
- The measurement inputs of controllers in standard signal implementation U and I are not interchangeable. The sensor type is stipulated with ordering of the device and must be set adjusted according to the implementation.

[SP19] SEN2/SEN2 - Sensor Type Zone 9...16

Data type	Byte
Adjustment range interfaces/ multiplier	[0]...255 / 1
Adjustment range BA	[FeL], FeJ, NiC, Pt, Str, Ni

↗[SP18] SEN1/SEN1 - Sensor Type Zone 1...8

[SP20] SEN3/SEN3 - Sensor Type Zone 17...24

Data type	Byte
Adjustment range interfaces/ multiplier	[0]...255 / 1
Adjustment range BA	[FeL], FeJ, NiC, Pt, Str, Ni

↗[SP18] SEN1/SEN1 - Sensor Type Zone 1...8

[SP21] SEN4/SEN4 - Sensor Type Zone 25...32

Data type	Byte
Adjustment range interfaces/ multiplier	[0]...255 / 1
Adjustment range BA	[FeL], FeJ, NiC, Pt, Str, Ni

↗[SP18] SEN1/SEN1 - Sensor Type Zone 1...8

[P033] OFFS/OFFS - Temperature Offset

Data type	Char
Adjustment range interfaces & BA / multiplier	-9.9...[0.0]...9.9 unit of the measured value / 10

The measured value of *the* measurement input is corrected as follows:

```
Corrected measured value = measured value + temperature offset
```

[SP28] OFF1/OFF1 - Offset Zone 1...8

Data type	Char
Adjustment range interfaces & BA / multiplier	-9.9...[0.0]...9.9 unit of the measured value / 10

For the measurement inputs of the zones 1 to 8 the following applies:

```
Corrected measured value = measured value + Offset Zone 1...8
```

[SP29] OFF2/OFF2 - Offset Zone 9...16

Data type	Char
Adjustment range interfaces & BA / multiplier	-9.9...[0.0]...9.9 unit of the measured value / 10

For the measurement inputs of the zones 9 to 16 the following applies:

```
Corrected measured value = measured value + Offset Zone 9...16
```

[SP30] OFF3/OFF3 - Offset Zone 17...24

Data type	Char
Adjustment range interfaces & BA / multiplier	-9.9...[0.0]...9.9 unit of the measured value / 10

For the measurement inputs of the zones 17 to 24 the following applies:

```
Corrected measured value = measured value + Offset Zone 17...24
```

[SP31] OFF4/OFF4 - Offset Zone 25...32

Data type	Char
Adjustment range interfaces & BA / multiplier	-9.9...[0.0]...9.9 unit of the measured value / 10

For the measurement inputs of the zones 25 to 32 the following applies:

```
Corrected measured value = measured value + Offset Zone 25...32
```

[P047] ANZ-/RG L - Lower Temperature Level at Standard Signal Inputs

Data type	Word
Adjustment range interfaces/ multiplier	-99...[0]...6553.6 unit of the measured value / 10
Adjustment range BA	-99...[0]...999 unit of the measured value / 10

For a measurement input of type standard signal U or I direct on the controller, the parameter stipulates the value which is displayed in case of a measured value equal to 0/2 VDC and 0/4 mA.
Related with the parameter ↗[P048] ANZ+/RG - Upper Temperature Level with Standard Signal Inputs a characteristic curve is defined, with its help the display values e.g for an input of 0...10V are calculated as follows:

```
Display value = 0.1 x (ANZ+ - ANZ-) x Measured value + ANZ
```

For measurement recording by CANAIN08/FIN08

- at APPL/APPL < 128 the actual value is not scaled
- at APPL/APPL >= 128 the display range of the actual value is defined by ANZ-RG L and/or ANZ+/RG H

↗[P036] APPL/APPL - Application

Is a thermocouple TC and/or resistance thermometer Pt100 directly connected to the controller, the parameter is without function.

[P048] ANZ+/RG - Upper Temperature Level with Standard Signal Inputs

Data type	Word
Adjustment range interfaces/ multiplier	-99...[1000]...6553.6 unit of the measured value / 10
Adjustment range BA	-99...[999] unit of the measured value

For a measurement input of type standard signal U or I direct on the controller, the parameter stipulates the value which is displayed in case of a measured value equal to 10 VDC and 20 mA.
↗[P047] ANZ-/RG L - Lower Temperature Level at Standard Signal Inputs

For measurement recording by CANAIN08/FIN08

- at APPL/APPL < 128 the actual value is not scaled
- at APPL/APPL >= 128 the display range of the actual value is defined by ANZ-RG L and/or ANZ+/RG H

↗[P036] APPL/APPL - Application

Is a thermocouple TC and/or resistance thermometer Pt100 directly connected to the controller, the parameter is without function.

[P057] NrIW/NoZN - Zone Allocation to Measurement Input on Sensor Interface FIN

Data type	Integer
Adjustment range interfaces & BA / multiplier	[-32]...255 / 1

0	The zone uses the measurement input assigned directly on the controller (Zone X - Measurement Input X)
>0	The zone uses the measurement input on a CANAIN08 or FIN08. Setting value dependent on address of the CANAIN08/FIN08: `Measurement input = (Address of the CANAIN08/FIN08 x 8) + (Measuring channel on CANAIN08/FIN08)` Zone 1 employs fifth measuring channel on a CANAIN08/FIN08 with address 2: Setting adjustment = (2 x 8) + 5 = 21 in case of Zone 1
<0	The zone uses the sensor input of another zone on the controller. Zone 1 uses measurement input of Zone 10: Adjustment = -10 in case of Zone 1

[SP23] INP1/INP1 - Function Digital Input 1

Data type Byte

Adjustment range interfaces & BA / multiplier [0]...255 / 1

- For setting < 100 the parameter is compatible to parameter INPD of controllers ETR132II, ETR112 and ETS132II and is valid for both digital inputs. ↗[SP24] INP2/INP2 - Function Digital Input 2 is without function.
- In case of setting values greater than 100, the parameter applies only for Digital Input 1. The function is stipulated which the controller implements with activated Digital Input 1.

	Digital Input 1	Digital Input 2	Digital Input 1 and 2
0	Regulation on 2. setpoint value	Heating actuator disconnected	Heating actuator disconnected
1	Relative reduction by 2. setpoint value	Heating actuator disconnected	Heating actuator disconnected
2	Regulation on 2. setpoint value	Regulation on 3. setpoint value	Regulation on 3. setpoint value
3	Relative reduction by 2. setpoint value	Relative reduction by 3. setpoint value	Relative reduction by 3. setpoint value
4	Regulation on 2. setpoint value	Regulation on 3. setpoint value	Regulation on 4. setpoint value
5	Relative reduction by 2. setpoint value	Relative reduction by 3. setpoint value	Relative reduction by 4. setpoint value
6	Regulation on 2. setpoint value	Reset-acknowledge stored alarms	Reset-acknowledge stored alarms
7	Relative reduction by 2. setpoint value	Reset-acknowledge stored alarms	Reset-acknowledge stored alarms
8	Regulation on 2. setpoint value	Start program function	Start program function
9	Relative reduction by 2. setpoint value	Start program function	Start program function
10	Regulation on 2. setpoint value	Regulation on 3. setpoint value	Regulation on 2. setpoint value
11	Relative reduction by 2. setpoint value	Relative reduction by 3. setpoint value	Relative reduction by 2. setpoint value
12	Regulation on 2. setpoint value (Zones 1-16)	Regulation on 2. setpoint value (Zones 17-32)	Regulation on 2. setpoint value (Zones 17-32)
13	Reduction relative by 2. setpoint value (Zones 1-16)	Reduction relative by 2. setpoint value (Zone 17-32)	Reduction relative by 2. setpoint value (Zone 17-32)
14	Regulation on 2. setpoint value	Regulation on 3. setpoint value	Regulation on 3. setpoint value
15	Relative reduction by 2. setpoint value	Relative reduction by 3. setpoint value	Start diagnostic function for sensor/heating
16	Relative reduction by 2. setpoint value	Setpoint value increase relative by 3. setpoint value	Setpoint value increase relative by 3. setpoint value
17	Relative reduction by 2. setpoint value	Setpoint value increase relative by 3. setpoint value	Start diagnostic function for sensor/heating
18	Relative reduction by 2. setpoint value	Time-controlled setpoint value increase relative by 3. setpoint value	Time-controlled setpoint value increase relative by 3. setpoint value
19	Percentage reduction/increasing by 2. setpoint value	Percentage reduction/increasing by 3. setpoint value	Percentage reduction/increasing by 4. setpoint value
20	Regulation on 2. setpoint value	Disconnected heating actuator, signal low active	Disconnected heating actuator, signal low active
21	Relative reduction by 2. setpoint value	Disconnected heating actuator, signal low active	Disconnected heating actuator, signal low active
22	Regulation on 2. setpoint value	Regulation on 3. setpoint value	Passivate all zones

	Digital Input 1	Digital Input 2	Digital Input 1 and 2
23	Relative reduction by 2. setpoint value	Relative reduction by 3. setpoint value	Passivate all zones
24	Heating actuator disconnected (Zones 1-16), signal high active	Heating actuator disconnected (Zones 17-32), signal high active	Heating actuator disconnected (Zones 17-32), signal high active
25	Heating actuator disconnected (Zones 1-16), signal low active	Heating actuator disconnected (Zones 17-32), signal low active	Heating actuator disconnected (Zones 17-32), signal low active
26	Regulation on 2. setpoint value	Start program function	Passivate all zones
27	Relative reduction by 2. setpoint value	Start program function	Passivate all zones
28	Degree of operation boost (degree of operation = 100%) for 10 seconds	Activate BA input block	Activate BA input block
29	Reset-acknowledge stored alarms	Activate BA input block	Activate BA input block
30	Regulation on 2. setpoint value	Disconnected heating actuator, signal low active	Disconnected heating actuator, signal low active
31	Relative reduction by 2. setpoint value	Disconnected heating actuator, signal low active	Disconnected heating actuator, signal low active
32... 39	n.a.	n.a.	n.a.
40	Regulation on 2. setpoint value	Instant group release when 2. setpoint value < setpoint value.	Instant group release when 2. setpoint value < setpoint value.
41	Relative reduction by 2. setpoint value	Instant group release	Instant group release
42... 99	n.a.	n.a.	n.a.

100	Regulation on 2. setpoint value
101	Regulation on 3. setpoint value
102	Regulation on 4. setpoint value
103	Relative reduction by 2. setpoint value
104	Relative reduction by 3. setpoint value
105	Relative reduction by 4. setpoint value
106	Setpoint value increase relative by 2. setpoint value
107	Setpoint value increase relative by 3. setpoint value
108	Setpoint value increase relative by 4. setpoint value
109	Percentage reduction/increasing by 2. setpoint value
110	Percentage reduction/increasing by 3. setpoint value
111	Percentage reduction/increasing by 4. setpoint value
112	Absolute reduction to 2. setpoint value, if 2. setpoint value < setpoint value
113	Absolute reduction to 3. setpoint value, if 3. setpoint value < setpoint value
114	Absolute reduction to 4. setpoint value, if 4. setpoint value < setpoint value
115	Disconnected heating actuator, signal active high
116	Disconnected heating actuator, signal low active
117	Heating actuator disconnected (Zones 1-16), signal high active
118	Heating actuator disconnected (Zones 1-16), signal low active
119	Heating actuator disconnected (Zones 17-32), signal high active

120	Heating actuator disconnected (Zones 17-32), signal low active
121	Passivate all zones
122	Activate BA input block
123	Reset-acknowledge stored alarms
124	Degree of operation boost (degree of operation = 100%) for 10 seconds
125... 199	n.a.
200	Start diagnostic function for sensor/heating (pushbutton)
201	Release all groups (group function) (pushbutton)
202	Start program function
203... 255	n.a.

[SP24] INP2/INP2 - Function Digital Input 2

Data type Byte

Adjustment range interfaces & BA / multiplier [0]...255 / 1

- In case of setting values of less than ↗[SP23] INP1/INP1 - Function Digital Input 1100, INP2 is without function.
- In case of setting values less than 100, no function is implemented.
- In case of setting values greater than 100, the parameter applies only for Digital Input 2. The function is stipulated which the controller implements with activated Digital Input 2.

100	Regulation on 2. setpoint value
101	Regulation on 3. setpoint value
102	Regulation on 4. setpoint value
103	Relative reduction by 2. setpoint value
104	Relative reduction by 3. setpoint value
105	Relative reduction by 4. setpoint value
106	Setpoint value increase relative by 2. setpoint value
107	Setpoint value increase relative by 3. setpoint value
108	Setpoint value increase relative by 4. setpoint value
109	Percentage reduction/increasing by 2. setpoint value
110	Percentage reduction/increasing by 3. setpoint value
111	Percentage reduction/increasing by 4. setpoint value
112	Absolute reduction to 2. setpoint value, if 2. setpoint value < setpoint value
113	Absolute reduction to 3. setpoint value, if 3. setpoint value < setpoint value
114	Absolute reduction to 4. setpoint value, if 4. setpoint value < setpoint value
115	Disconnected heating actuator, signal active high
116	Disconnected heating actuator, signal low active
117	Heating actuator disconnected (Zones 1-16), signal high active
118	Heating actuator disconnected (Zones 1-16), signal low active
119	Heating actuator disconnected (Zones 17-32), signal high active
120	Heating actuator disconnected (Zones 17-32), signal low active
121	Passivate all zones
122	Activate BA input block
123	Reset-acknowledge stored alarms

124	Degree of operation boost (degree of operation = 100%) for 10 seconds
125... 199	n.a.
200	Start diagnostic function for sensor/heating (pushbutton)
201	Release all groups (group function) (pushbutton)
202	Start program function
203... 255	n.a.

9.3 Configuration/Functions Outputs

[P002] STGR/OPWR - Degree of Operation

Data type Char
Adjustment range interfaces & BA / multiplier -100...[0]...100% / 1

Actuating variable. Calculated in the standard operation through controllers. In the manual mode, the specification is implemented manually by the operator.
↗[P003] STBE/MANU - Manual Mode

[P039] RELH/RELH - RELH/RELH - Heating Relay Output

Data type Bit
Adjustment range interfaces [0], 1
Adjustment range BA [off], on

Stipulates the manner in which the actuating signal is output at the heating control output. Through this, an adaptation of the actuating signal to the actuator (SSR, relay) is possible.

0	off	Output of the actuating variable through fast clocked pulse groups (e.g. for the output to solid state relay). The minimum pulse width is 40 ms.
1	on	Per sampling cycle (corresponds to sampling time) the actuating variable is output in the block (one-time switching on and off of the setting output). The operating time is proportional to the degree of operation with reference to the sampling time. In order to take care of the actuator the ↗[P018] TA-H /CT-H - Heating Sampling Time is set to a minimum of 10 seconds.

[P040] RELK/RELC - Cooling Relay Output

Data type Bit
Adjustment range interfaces 0, [1]
Adjustment range BA off, [on]

Adjustment always on.

1	on	Per sampling cycle (corresponds to sampling time) the actuating variable is output in the block (one-time switching on and off of the setting output). The operating time is proportional to the degree of operation with reference to the sampling time. The ↗[P022] TA-K /CT - Cooling Sampling Time is limited to a minimum of 10 seconds.

[P023] STGH/OUTH - Heating Degree of Operation Damping

Data type Char
Adjustment range interfaces & BA / multiplier 0...[100]% / 1

Correction of the heating degree of operation:

```
Corrected degree of operation = degree of operation x 0.01 x setting value
```

Setting value STGH/OUTH = 75
Uncorrected degree of operation = 85%
Corrected degree of operation = 85% x 0.01 x 75 = 63% (rounded)

[P024] STGK/OUTC - Cooling Degree of Operation Damping

Data type	Char
Adjustment range interfaces & BA / multiplier	0...[100]% / 1

Correction of the degree of operation cooling:

```
Corrected degree of operation = degree of operation x 0.01 x setting value
```

Setting value STGK/OUTC = 75
Uncorrected degree of operation = -40%
Corrected degree of operation = -40% x 0.01 x 75 = -30%

[P025] STG%/OUT% - Maximum Degree of Operation in Manual Mode

Data type	Char
Adjustment range interfaces & BA / multiplier	0...[100]% / 1

Limitation of the maximum heating degree of operation in manual mode. Can be set e.g. as a safety function for the function ↗[P037] FBA /TC-A - Manual Mode after Sensor Break.

9.4 Basic Functions

[P003] STBE/MANU - Manual Mode

Data type	Bit
Adjustment range interfaces	[0], 1
Adjustment range BA	[off], on

[0]	[off]	Regulation active. Degree of operation is calculated from the control algorithm.
1	on	Regulation deactivated. Manual specification of the ↗[P002] STGR/OPWR - Degree of Operation. In manual mode, a zone, e.g. in case of a defect of the measuring means (e.g. sensor break with thermocouple) can be further operated in emergency operation. In manual mode the alarms are further monitored and the heating current monitoring also continues to function.

↗[P037] FBA /TC-A - Manual Mode after Sensor Break

[P028] ANFB/STMO - Startup Operation

Data type	Bit
Adjustment range interfaces	[0], 1
Adjustment range BA	[off], on

Function for temperature control field of application of hot conduit systems for the dehydrating of heating elements after start of temperature control.
If, after a reset of the controller

- in case of an active zone
- whose setpoint value is greater than 100°C

a temperature actual value is identified less than 90°C, the time set adjusted under ↗[P029] ANFZ/STT - Startup Operation Initiation Timeis controlled to 100°C. The time starts when the actual values of all zones of the controller,

with which the startup operation is activated, have been one-time in the tolerance band of the startup setpoint value of 100°C.
In case of networking of several controllers over CAN, the function works with controller-overall effect.

[P029] ANFZ/STT - Startup Operation Initiation Time

Data type	Byte
Adjustment range interfaces/ multiplier	[0]...255 minutes / 1
Adjustment range BA	[0]...99 minutes

↗[P028] ANFB/STMO - Startup Operation

[P054] NrFZ/NoCO - Leading Zone

Data type	Byte
Adjustment range interfaces & BA / multiplier	[0]...255 / 1

Function used to control the zone with the degree of operation of another zone. It is used e.g. in case of defect of the error sensing device corresponding to the zone (e.g. sensor break). In order to maintain the operation of the control zone in spite of that, the zone in the leading zone operation is operated with the degree of operation of a similar zone.

[0]	Leading zone operation deactivated. Zone employs its own degree of operation calculated through the regulation or stipulated manually.
>0	The zone employs the degree of operation of the zone stipulated in the setting value. Since the function works with controller-overall effect (Prerequisite: Controller connected over CAN) the controller address is a component part of the setting value: `Leading zone NrFZ/NoCO = (DIP switch setting x 32) + zone number` In the case of a zone with defective sensor, the degree of operation of the fifth zone of the controller should be employed as leading zone, with which the addressing DIP Switches 1 and 2 are set to on (corresponds to Address 3): NrFZ/NoCO = (3 x 32) + 5 = 101 The degree of operation output is completely synchronous, if ■ the zone is located on the same controller ■ the ↗[P053] K-FZ/K-CO - Amplification Factor for Leading Zone is set equal to 0 If both conditions are not fulfilled, an asynchronous output value signal is then implemented. A cascading of the leading zone is not permissible. In case of invalid inputs (when e.g. a zone is entered as a leading zone which itself has a reference to a leading zone), the setting value is set automatically to 0.

[P053] K-FZ/K-CO - Amplification Factor for Leading Zone

Data type	Char
Adjustment range interfaces/ multiplier	-128...[0]...128 / 1
Adjustment range BA	-99...[0]...100

Enables the adaptation of the degree of operation of the leading zone for the zone led.
`Adapted degree of operation = Degree of operation x (1 + (0.01 x K-FZ))`

The degree of operation of the leading zone should basically be increased by 10%: K-FZ/K CO = 10
In the case of a degree of operation of the leading zone of 50%, the following corrected degree of operation is calculated:
Adapted output value = 50% x (1 + (0.01 x 10)) = 55%
↗[P054] NrFZ/NoCO - Leading Zone

[P049] TRMP/TRMP - Temperature Ramp

Data type	Word
Adjustment range interfaces/ multiplier	[0]...6553.5 / 10
Adjustment range BA	-99.9...[0]...99.9 Unit of the measurement input/minute

Characteristic behavior of the setpoint value at setpoint value changes.

[0.0]	In case of setpoint value jump with setpoint value increases and setpoint value decreases.
>0.0	In case of setpoint value increases, the setpoint value is ramped with the setting value to the final setpoint value, starting from the current actual value. Setpoint value jump with setpoint value decreases.
<0.0	In case of setpoint value increases and setpoint value decreases, the setpoint value is ramped with the setting value to the final setpoint value starting from the current actual value.

[P050] ARMP/ARMP - Automatic Temperature Ramp

Data type	Bit
Adjustment range interfaces/ multiplier	[0], 1
Adjustment range BA	[off], on

[0]	[off]	In the case of the zone, the automatic ramp operation is deactivated.
1	on	In the case of the zone, the automatic ramp operation is activated.

All active zones assigned to a group (↗[P058] GPNr/GPNo - Group Number) with a setpoint value greater than 100°C/32°F, with which the automatic ramping function is activated, are heated up at a setpoint value change > 30 °C automatically with respect to the actual value of the zone with the least rate of rise. The zone with the least rate of rise is called the reference zone.

With the aid of the function, mechanical stresses through large temperature gradient between zones of different rate of rise can be avoided.

In case of networking of several controllers over CAN, the function works with controller-overall effect.

- The automatic ramping function can also be employed in combination with the ↗[P035] IDEN/IDEN - Heating Identification. With that, the uniform warming is implemented also in the case where the controller does not yet have any knowledge about the control zone and where this will be first calculated on the basis of the identification which progresses parallel to the automatic ramp.
- If the temperature difference of a zone to the reference zone is at least 30 Kelvin, or if no heating current is measured by a zone any longer, the zone is taken from the link of the automatic ramp after a time of 20 seconds.
- The automatic ramp requires one (at least once) executed identification Heating.

[SP26] AGAP/GAP - Tolerance Band for Automatic Ramp

Data type	Byte
Adjustment range interfaces/ multiplier	0...[5]...25.5 Unit of measurement input / 10
Adjustment range BA	0...[5]...20

Unit of the measurement input

Stipulation of the tolerance band indicating how much the measured values of the zones may differ in automatic ramp operation. Zones which exceed the tolerance range are trimmed in the degree of operation.

[P037] FBA /TC-A - Manual Mode after Sensor Break

Data type	Bit
Adjustment range interfaces	[0], 1
Adjustment range BA	[off], on

Stipulates the characteristic behavior of the zone in the case of a sensor break.

[0]	[off]	Function is deactivated.
1	on	At sensor break it is automatically switch to manual mode. The output value is calculated dependent on the mean output value from the last cycles before sensor break.

Sensor break during heating-up can lead to overheating when automatic transfer of degree of operation, because in this phase the maximal degree of operation is output. A limitation for the degree of operation in manual mode can be set by parameter ↗[P025] STG%/OUT% - Maximum Degree of Operation in Manual Mode.

[P041] FAL /TCAL - Sensor Short-Circuit Monitoring FAL

Data type	Bit
Adjustment range interfaces	[0], 1
Adjustment range interfaces & BA	[off], on

Complex, dynamic monitoring function of the measuring element (sensor) per zone. The function helps to identify (as well as the static monitoring on sensor break and sensor incorrect polarity) to avoid additional error states in the area of the sensor and damage to the control zone e.g. through overheating.

An FAL alarm is output, when

- no identification is running
- at active heating current monitoring (ADEF/AMPD <> 0, ASOL/AMPN > 0, ATOL/AMPT > 0)
- no current alarm is pending

Two causes can result in a FAL alarm:

- If the difference between current actual value and the last sampled actual value is
  ↗[P018] TA-H /CT-H - Heating Sampling Time < 4 sec => 30K in 0,5 sec
  ↗[P018] TA-H /CT-H - Heating Sampling Time >= 4 sec => 20K in 0,5 sec
  then a FAL alarm is immediately triggered after a pre-determined number of control cycles, since, with this actual value characteristic, it must involve a defect on the sensor line or on the sensor.
- If the temperature actual value does not increase by 4 K in standard operation in case of maximum degree of operation (↗[P023] STGH/OUTH - Heating Degree of Operation Damping) within a pre-determined time, then a FAL alarm is triggered.

  The response time of the sensor short-circuit monitoring

  - can be stipulated either manually (↗[P042] FALT/FALT - Sensor Short-Circuit Monitoring Time <> 0) or

  or

  - is derived automatically from the sampling time of the zone (↗[P042] FALT/FALT - Sensor Short-Circuit Monitoring Time = 0).

  Due to the response time, mistakenly triggered FAL alarms are reduced. The response time is started at the time when all prerequisites for a FAL alarm are satisfied. The response time is reset when one of the prerequisites for a FAL is not satisfied during the response time.

  According to the operating point, different FAL response times are worked with:

  - in the setpoint value band: FAL response time = 30 x heating sampling time
  - outside of the setpoint value band: FAL response time = 20 x heating sampling time
  - minimal response time (for TA-H/CT-H < 15 seconds): FAL response time = 20 x 15 seconds

  The setpoint value band is derived directly from the ↗[P015] XP-H /XP-H - Heating Proportional Band:

  SWB = XPH x 4

↗[P042] FALT/FALT - Sensor Short-Circuit Monitoring Time

[P042] FALT/FALT - Sensor Short-Circuit Monitoring Time

Data type	Word
Adjustment range interfaces/ multiplier	[0]...6553.6 seconds / 10
Adjustment range BA	[0]...999 seconds

[0]	Not active.

>0	Period after which a FAL alarm is output when the temperature actual value in standard operation at maximum degree of operation ↗[P023] STGH/OUTH - Heating Degree of Operation Dampinghas not increased by 4 K. (↗[P041] FAL /TCAL - Sensor Short-Circuit Monitoring FAL and the stipulated FAL response times are without function.

9.5 Setpoint Value Functions

[P001] SOLL/SP - Setpoint Value

Data type	Integer
Adjustment range interfaces/ multiplier	[0.0]...6553.6 Unit of the measurement input / 10
Adjustment range BA	0...999

Unit of the measurement input

Main setpoint value on which control is implemented when 2., 3. or 4. setpoint value not active.

- With setpoint value 0°C/32°F, the zone is passivated. Only the current alarm at "switched off heating" continues to be monitored.
- With setpoint value 0°C/32°F, the control algorithm is reinitialized
- With active manual mode, the setpoint value is without function.

[P012] 2SOL/SP2 - 2. Set Point/2. Lowering Value

Data type	Integer
Adjustment range interfaces/ multiplier	[0.0]...1999.9 Unit of the measurement input / 10
Adjustment range BA	[0]...999 Unit of the measurement input

The second setpoint value is employed either (a) directly as a setpoint value or (b) as a setpoint value in the program function.

(a) Directly as a setpoint value

The second setpoint value is activated

- over a digital input for all zones simultaneously
- over the data interfaces for every zone separately.

aktiviert.

Over the parameters ↗[SP23] INP1/INP1 - Function Digital Input 1 and ↗[SP24] INP2/INP2 - Function Digital Input 2, it is stipulated, whether

- control is implemented on a second setpoint value or whether
- control is implemented on the ↗[P001] SOLL/SP - Setpoint Value reduced by the lowering value.

The reduction over digital input has a higher priority than the zone-specific software reduction.

b) As a setpoint value in the program function

The controller has a program function. With this, an arbitrary setpoint value profile can be realized with the four setpoint values.

If the program function should be used, then

- the ↗[P028] ANFB/STMO - Startup Operation must be deactivated.
- the system parameter ↗[SP23] INP1/INP1 - Function Digital Input 1 is set adjusted to 8 or 9.

The program function is started by the negative signal edge at the digital input 2.

The following setpoint value profile will run:

- ↗[P012] 2SOL/SP2 - 2. Set Point/2. Lowering Value with↗[P030] AFZ2/STT2 - Start-up Time of 2. Set Point/2. Lowering Value
- ↗[P013] 3SOL/SP3 - 3. Set Point/3. Lowering Value with↗[P031] AFZ3/STT3 - Start-up Time of 3. Set Point/3. Lowering Value
- ↗[P014] 4SOL/SP4 - 4. Set Point/4. Lowering Value with↗[P032] AFZ4/STT4 - Start-up Time of 4. Set Point/4. Lowering Value

The start-up time for the 2. setpoint value is not started until the actual values

- of all active zones
- whose setpoint value is not equal to 0°C

have reached the tolerance band around the second setpoint value. That is, the start-up time for the second setpoint value is not started until the "slowest" zone reaches the tolerance band around the second setpoint value.

It is to be ensured that the actual value can reach the tolerance band, because otherwise the program function will never be started.

[P013] 3SOL/SP3 - 3. Set Point/3. Lowering Value

Data type	Integer
Adjustment range interfaces/ multiplier	[0.0]...1999.9 Unit of the measurement input / 10
Adjustment range BA	[0]...999 Unit of the measurement input

↗[P012] 2SOL/SP2 - 2. Set Point/2. Lowering Value

[P014] 4SOL/SP4 - 4. Set Point/4. Lowering Value

Data type	Integer
Adjustment range interfaces/ multiplier	[0.0]...1999.9 Unit of the measurement input / 10
Adjustment range BA	[0]...999 Unit of the measurement input

↗[P012] 2SOL/SP2 - 2. Set Point/2. Lowering Value

[P026] SOL-/SPLO - Lower Setpoint Value Limit

Data type	Integer
Adjustment range interfaces/ multiplier	[0.0]...1999.9 Unit of the measurement input / 10
Adjustment range BA	[0]...999 Unit of the measurement input

Lower input limitation for all temperature setpoints.

[P027] SOL+/SPHI - Upper Setpoint Value Limit

Data type	Integer
Adjustment range interfaces/ multiplier	0.0...[500.0]...1999.9 Unit of measurement input / 10
Adjustment range BA	0...[500]...999 Unit of the measurement input

Upper input limitation for all temperature setpoints.
Exceeding the upper setpoint value limit an alarm is activated, when more than 5 seconds
`(Temperature actual value > SOL+/SPHI + 5K)`

Output in manual mode: degree of operation -100%
Output in control mode: degree of operation -100%... 0%, depending on control status
The alarm resets, as long as not otherwise configured, when the actual temperature value falls below the limit value.
An alarm is suppressed, when
`SOL+/SPHI < 150°C`

[P030] AFZ2/STT2 - Start-up Time of 2. Set Point/2. Lowering Value

Data type	Byte
Adjustment range interfaces/ multiplier	[0]...255 minutes / 10
Adjustment range BA	[0]...99 minutes

The setting value 0 deactivates the start-up time of the second setpoint value and/or the second lowering value.
↗[P012] 2SOL/SP2 - 2. Set Point/2. Lowering Value

[P031] AFZ3/STT3 - Start-up Time of 3. Set Point/3. Lowering Value

Data type	Byte
Adjustment range interfaces/ multiplier	[0]...255 minutes / 1
Adjustment range BA	[0]...99 minutes

The setting value 0 deactivates the start-up time of the third setpoint value and/or the third lowering value.
↗[P030] AFZ2/STT2 - Start-up Time of 2. Set Point/2. Lowering Value
↗[P012] 2SOL/SP2 - 2. Set Point/2. Lowering Value

[P032] AFZ4/STT4 - Start-up Time of 4. Set Point/4. Lowering Value

Data type	Byte
Adjustment range interfaces/ multiplier	[0]...255 minutes / 1
Adjustment range BA	[0]...99 minutes

The setting value 0 deactivates the start-up time of the fourth setpoint value and/or the fourth lowering value.
↗[P030] AFZ2/STT2 - Start-up Time of 2. Set Point/2. Lowering Value
↗[P012] 2SOL/SP2 - 2. Set Point/2. Lowering Value

9.6 Control characteristic

- The controller has two control parameter sets for heating and cooling. The second control parameter set is without function.
- The automatic calculation of the control parameters comes about through the so-called identification in case of setpoint value changes, above a pre-determined height. The calculation of the control parameters cooling is coupled with the calculation of the heating control parameters.

[P015] XP-H /XP-H - Heating Proportional Band

Data type	Byte
Adjustment range interfaces/ multiplier	0.0...[9.9]...25.5%/10
Adjustment range BA	0.0...[9.9]...25.5%

The P content changes the output of the PID controller proportional to the deviation between setpoint and actual value.

The proportional band is the range of the process variable, in which this linear reinforcement occurs before the output achieves its maximum or minimum. This range is indicated in percent of the measuring range. In order that the adjusted proportional band is independent of the sensor type and/or measuring range, the controller measuring range in case of PSG controllers is assumed at 500°C (1% corresponds to 5 K).

The amplification of the controller decreases with increasing proportional band, and increases with decreasing proportional band. In case of a proportional band selected too small, the controller reacts to small deviations so severely that the control system oscillates. On the other hand, a proportional band which is selected too large makes the regulation very slow. The controller no longer reacts adequately to faults. In case of utilization of pure proportional band controllers in the control system, the deviation cannot be eliminated fully. There results the so-called permanent deviation.

[P016] TD-H /TD-H - Heating Derivative Time

Data type	Byte
Adjustment range interfaces & BA / multiplier	0...[2]...255 seconds / 1

The differential content (D content) of the PID controller reacts in a leading way to the rate of change of the deviation or the actual value.

The differential content then supplies only a actuating variable, if the deviation or the actual value is changed. Therefore it cannot be used in order to stabilize a constant control deviation. That also explains the utilization of the D regulator only in association with P or PI characteristic.

The importance of the differential content in practice lies in the fact that the controller supplies actuating variables when the deviation first arises. The D characteristic makes the controller more rapid than a pure P or PI controller.

However, the D characteristic cannot distinguish between real deviations and so-called hum disturbances, i.e. higher frequency superpositions on the measurement variable. A differential content which is set adjusted too large reacts to the disturbances with fast changes of the actuating variable, through which the control system becomes very unsteady.

[P017] TI-H /TI-H - Heating Integral Time

Data type	Word
Adjustment range interfaces/ multiplier	0...[9]...65536 seconds / 1
Adjustment range BA	0...[9]...999 seconds

With the integral content (I content) of the controller, a continuous change of the controller output value is achieved until the permanent deviation is stabilized to zero. With this, a permanent deviation is prevented.

The speed with which the stabilizing of the deviation happens and/or the influence of the I content on the actuating signal, is a function of the integral time (also: Integral time). A short integral time means a great influence of the I content on the setting value, i.e. it is integrated fast. A large integral time performs in reverse.

If the proportional band is changed, this also means a changed time-related characteristic with unchanged integral time.

The maximum of the ↗[P035] IDEN/IDEN - Heating Identificationcalculated parameter value is 1275

[P018] TA-H /CT-H - Heating Sampling Time

Data type	Byte
Adjustment range interfaces/ multiplier	[0]...255 seconds / 1
Adjustment range BA	[0]...60 seconds

The sampling time defines a time period after which a ↗[P002] STGR/OPWR - Degree of Operation, which is re-calculated from the control algorithm is output at the control output.
The sampling time is directly dependent on the dynamics of the controlled system and it is directly stipulated at the beginning of the ↗[P035] IDEN/IDEN - Heating Identification

[P019] XP-K /XP-C - Cooling Proportional Band

Data type	Byte
Adjustment range interfaces/ multiplier	0.0...[9.9]...25.5% / 10
Adjustment range BA	0.0...[9.9]...25.5%

↗[P015] XP-H /XP-H - Heating Proportional Band

[P020] TD-K /TD-C - Cooling Derivative Time

Data type	Byte
Adjustment range interfaces & BA / multiplier	0...[2]...255 seconds / 1

↗[P016] TD-H /TD-H - Heating Derivative Time

[P021] TI-K /TI-C - Cooling Integral Time

Data type	Word
Adjustment range interfaces/ multiplier	0...[9]...65535 seconds / 1
Adjustment range BA	0...[9]...999 seconds

↗[P017] TI-H /TI-H - Heating Integral Time

[P022] TA-K /CT - Cooling Sampling Time

Data type	Byte
Adjustment range interfaces/ multiplier	[0]...255 seconds / 1
Adjustment range BA	[0]...60 seconds

↗[P018] TA-H /CT-H - Heating Sampling Time

[P034] ONLK/ONLC - Online Control

Data type	Bit
Adjustment range interfaces/ multiplier	0, [1]
Adjustment range BA	off, [on]

0	off	Without Function.
[1]	[on]	After the calculation of the control parameters through the ↗[P035] IDEN/IDEN - Heating Identification the characteristic behavior of the control zone is compared with the characteristic behavior of one controller-internal-filed model of the controlled system. In case of deviations of the characteristic behavior from real controlled system and the section model, the control parameters are corrected appropriately. The control parameters heating are not modifiable. They are overwritten immediately again through the control parameters calculated from the section model.

See ↗Table Overview Adaptation Methods of Control Parameters

[P035] IDEN/IDEN - Heating Identification

Data type	Bit/1
Adjustment range interfaces/ multiplier	0/[1]
Adjustment range BA	off/[on]

In the identification phase the controller determines the mathematic model of a controlled system, which is saved in the controller. The control parameters are calculated. Settings of parameter see ↗Table Overview Adaptation Methods of Control Parameters

[P045] PAKF/CFIX - Cooling Parameter Fixed (Heating Identification)

Data type	Bit
Adjustment range interfaces/ multiplier	[0], 1
Adjustment range BA	[off], on

Specifies whether the Cooling control parameters are derived from the Heating control parameters after identification (only for 3-point zones).
Settings of parameter see ↗Table Overview Adaptation Methods of Control Parameters

Table Overview Adaptation Methods of Control Parameters

[P061] ALGO/ALGO	Calculation of control parameter set Heating ↗[P035] IDEN/IDEN - Heating Identification	[P061] ALGO/ALGO	Calculation of control parameter set Cooling on identification Heating ↗[P045] PAKF/CFIX - Cooling Parameter Fixed (Heating Identification)
0 / **3** / **4** / **5** MAControl **)	**[P035] IDEN/IDEN = on** Calculation of control parameters heating after a zone reset. i.e. ▪ Controller is switched on ▪ Status change of zone passive to zone active ▪ Setpoint value > 0°C/ 0°F after first setpoint value increase with control deviation > 50K. Start of identification phase, in case of rise of actual value within 10 seconds < 0.4K (drift control). See *)	**0** / **3** / **4** MAControl **)	**[P045] PAKF/CFIX = on** Control parameter set cooling are not modified by identification heating.
			[P045] PAKF/CFIX = off Calculation of control parameter set cooling based on control parameters heating after end of identification phase heating.
	[P035] IDEN/IDEN = off No calculation of control parameters heating in case of heating up. See *)		-

1 / **2** / **6** DYNControl**)	**[P035] IDEN/IDEN = on** Calculation of control parameters heating after a zone reset. i.e. ▪ controller is switched on ▪ Status change of zone passive to zone active ▪ Setpoint value > 0°C/ 0°F after first setpoint value increase with control deviation > 50K. Start of identification phase, in case of rise of actual value within 10 seconds < 0.4K (drift control). See *)	**1** / **2** DYNControl**)	**[P045] PAKF/CFIX = on** Control parameter set cooling are not modified by identification heating.
			[P045] PAKF/CFIX = off Calculation of control parameter set cooling based on control parameters heating after end of identification phase heating.
	[P035] IDEN/IDEN = off No calculation of control parameters heating in case of heating up. See *)		-

*) Online control ↗[P034] ONLK/ONLC - Online Control monitors on base of the control parameter set heating essential changes on the structure of the control system and corrects if necessary the control parameter set heating.

**) Special see ↗[P061] ALGO/ALGO - Algorithm

[P061] ALGO/ALGO	Calculation of control parameter set Cooling after setpoint value change of -30K (independent of parameters)	Calculation of control parameter set Cooling after code number input
0 / **3** / **4** MAControl **)	On setpoint value change > -30K a cooling adaptation is started.	Independent of setting of PAKF/CFIX the code numbers 111 and 112 control the cooling adaptation. Code number 111: Calculation of control parameter sets of all 3-point operation zones (KHLG/ COOL = on), with setpoint value > 0°C/0°F. Code number 112: Calculation of control parameters of selected zones. Zone selection by setting of bit 0x80 in control byte of zones. Bit 0x08 in control byte is reset automatically. Start of cooling adaptation, in case of rise of actual value within 10 seconds <= +/-2K (drift control) and all actual values within tolerance band of 2K around setpoint value.
	On setpoint value change > -30K a cooling adaptation is started and the control parameter set cooling is calculated. Start of cooling adaptation, in case of rise of actual value within 10 seconds <= +/- 3,5K (drift control).	
	-	
1 / **2** DYNControl **)	-	Independent of setting of PAKF/CFIX the code numbers 111 and 112 control the cooling adaptation. Code number 111: Calculation of control parameter sets of all 3-point operation zones (KHLG/ COOL = on), with setpoint value > 0°C/0°F. Code number 112: Calculation of control parameters of selected zones. Zone selection by setting of bit 0x80 in control byte of zones. Bit 0x08 in control byte is reset automatically. Start of cooling adaptation, in case of rise of actual value within 10 seconds <= +/-2K (drift control) and all actual values within tolerance band of 2K around setpoint value.
	-	

**) Special see ↗[P061] ALGO/ALGO - Algorithm

[P061] ALGO/ALGO - Algorithm

Data type	Byte
Adjustment range interfaces/ multiplier	[0]...255 / 1
Adjustment range BA	[0]...6

Stipulates which algorithm is employed for the regulation of the zone.
Settings of parameter see ↗Table Overview Adaptation Methods of Control Parameters

ALGO/ALGO = [0]	MAControl
	Suitable for all modes of actuating signal output (PWM / pulse cooling)

ALGO/ALGO = 1	DYNControl. Control characteristic more dynamic than that of the MAControl.
	The calculation of the control parameters is implemented during the identification phase, up to reaching the setpoint value.

ALGO/ALGO = 2	DYNControl.
	The calculation of the control parameters is implemented during the identification phase to 10 K prior to reaching the adjusted setpoint value.

ALGO/ALGO = 3	MAControl for evaporate cooling with intelligent disturbance control ISK (see ↗[P070] PKLG/PGH - Pulse Cooling)
	ISK includes: ■ Special degree of operation characteristics for static operation in the range of 0% around degree of operation ■ Algorithm for watching of operating point ■ „Stricter" control characteristics in tolerance band around setpoint value

ALGO/ALGO = 4	MAControl for evaporate cooling with intelligent disturbance control ISK in alleviated form (see ↗[P070] PKLG/PGH - Pulse Cooling)
	ISK includes: ■ Special degree of operation characteristics for static operation in the range of 0% around degree of operation ■ Algorithm for watching of operating point

ALGO/ALGO = 5	MAControl for die bolts
	■ Applies only for ETS132net in operation with CANSTI II and output modules MA08. ■ No mixed operation possible between die bolts - and standard control algorithm on one controller. In case of selection of die bolt control algorithm for at least one zone, then the die bolt control algorithm is employed with all the other zones. ■ Heating current monitoring not possible. ■ Degree of operation resolution 0.25%

ALGO/ALGO = 6	DYNControl for die bolts
	Remaining operations as under adjustment for ALGO/ALGO = 5.

[P062] XPH2/XPH2 - Heating Proportional Band 2

Data type	Byte
Adjustment range interfaces/ multiplier	0.0...[9.9]...25.5% / 10
Adjustment range BA	0.0...[9.9]...25.5%

Without function

[P063] TDH2/TDH2 - Heating Derivative Time 2

Data type	Byte
Adjustment range interfaces & BA / multiplier	0...[2]...255 seconds / 1

Without function

[P064] TIH2/TIH2 - Heating Integral Time 2

Data type	Word
Adjustment range interfaces/ multiplier	0...[9]...65535 seconds / 1
Adjustment range BA	0...[9]...1275 seconds

Without function

[P065] TAH2/CTH2 - Heating Sampling Time 2

Data type	Byte
Adjustment range interfaces/ multiplier	[0]...255 seconds / 1
Adjustment range BA	[0]...60 seconds

Without function

[P066] XPK2/XPC2 - Cooling Proportional Band 2

Data type	Byte
Adjustment range interfaces/ multiplier	0.0...[9.9]...25.5% / 10
Adjustment range BA	0.0...[9.9]...25.5%

Without function

[P067] TDK2/TDC2 - Cooling Derivative Time 2

Data type	Byte
Adjustment range interfaces & BA / multiplier	0...[2]...255 seconds / 1

Without function

[P068] TIK2/TIC2 - Cooling Integral Time 2

Data type	Word
Adjustment range interfaces/ multiplier	0...[9]...65535 seconds / 1
Adjustment range BA	0...[9]...1275 seconds

Without function

[P069] TAK2/CTC2 - Cooling Sampling Time 2

Data type	Byte
Adjustment range interfaces/ multiplier	[0]...255 seconds / 1
Adjustment range BA	[0]...60 seconds

Without function

[P070] PKLG/PGH - Pulse Cooling

Data type	Bit
Adjustment range interfaces	[0], 1
Adjustment range BA	[off], on

Output method of the actuating signal at the cooling control output.
Prerequisite for the pulse cooling is that ↗[P038] KHLG/COOL - 3-Point Operation is activated.

[0]	[off]	A PWM signal, proportional to the degree of operation, is output at the cooling control output.
1	on	In case of the pulse cooling (also: impulse cooling), the pulse duration is constant at the cooling control output and the pause duration (between 2 impulses) is variable. A pause of variable length follows on a constant pulse The pause length is limited by the parameter ↗[P072] PMIN/PMIN - Minimum Pause Duration and ↗[P073] PMAX/PMAX - Maximum Pause Duration . The mandatory pause adjustable through the parameter ↗[P072] PMIN/PMIN - Minimum Pause Duration and should prevent the transition from evaporating to continuous water flow. PMIN should correspond to a cooling pulse in about the reaction time of the route sections. Changes of the degree of operation are incorporated only on completion of the current pulse separation. The relationship between pulse width and maximum pause duration determines the real degree of operation resolution. For a one-percent degree of operation resolution ↗[P073] PMAX/PMAX - Maximum Pause Duration at least the hundred-fold time value of ↗[P071] PULS/PULS - Pulse Duration is to be to set adjusted (please be sure to consider the different units of the parameters).

In case of activated pulse cooling the suitable control algorithm has to be stipulated for each zone (see ↗[P061] ALGO/ALGO - Algorithm).

[P071] PULS/PULS - Pulse Duration

Data type	Word
Adjustment range interfaces & BA	4...[10]...500 (x10) ms

Defines the duration of an impulse at the control output cooling in case of active ↗[P070] PKLG/PGH - Pulse Cooling

Be sure to consider that the pulse duration is 10x the setting value.

The setting value should

- be long enough so that the actuator (e.g. solenoid valve) can act properly
- be large enough to determine a change of the actual value

However, the setting value should be selected so that the actual value changes with an individual pulse only insignificantly.

In case of changes of the parameters of the pulse cooling, it is absolutely necessary that the control parameters be adapted to cooling.

↗[P070] PKLG/PGH - Pulse Cooling

[P072] PMIN/PMIN - Minimum Pause Duration

Data type	Word
Adjustment range interfaces/ multiplier	0.0...[5.0]...6553.5 seconds / 10
Adjustment range BA	0.0...[5.0]...99.9 seconds

Minimum duration between two pulses in case of active ↗[P070] PKLG/PGH - Pulse Cooling

[P073] PMAX/PMAX - Maximum Pause Duration

Data type	Word
Adjustment range interfaces/ multiplier	0.0...[20.0]...6553.5 / 10
Adjustment range BA	0.0...[20.0]...99.9 seconds

Maximum duration between two pulses in case of active ↗[P070] PKLG/PGH - Pulse Cooling

9.7 Alarm management

Every zone of the controller is monitored on the following alarm values:

- 4 Temperature limit value alarms
- Current alarm in case of "Heating On", i.e. monitoring of the measured current within a ↗[P010] ATOL/AMPT - Current Tolerance by the ↗[P011] ASOL/AMPN - Current Setpoint Value.
- Current alarm in case of "Heating Off", i.e. control as to whether a heating current is measured in the switched off status of the heating control output.
- Sensor break
- Sensor incorrect polarity
- Sensor short-circuit

The status of the zones can be output as collective alarm on the collective alarm outputs AL1, AL2 and AL3 .

[P004] GW 1/AL 1 - Limit Value 1

Data type	Integer
Adjustment range interfaces & BA / multiplier	[0]...255 / 1

Stipulation of the first temperature limit value.
Functioning method is stipulated in ↗[P008] GWD1/ALD1 - Limit Value Definition 1.

[P005] GW 2/AL 2 - Limit Value 2

Data type	Integer
Adjustment range interfaces & BA / multiplier	[0]...255 / 1

Stipulation of the second temperature limit value.
Functioning method is stipulated in ↗[P008] GWD1/ALD1 - Limit Value Definition 1.

[P006] GW 3/AL 3 - Limit Value 3

Data type	Integer
Adjustment range interfaces & BA / multiplier	[0]...255 / 1

Stipulation of the third temperature limit value.
Functioning method is stipulated in ↗[P009] GWD2/ALD2 - Limit Value Definition 2.

[P007] GW 4/AL 4 - Limit Value 4

Data type	Integer
Adjustment range interfaces & BA / multiplier	[0]...255 / 1

Stipulation of the fourth temperature limit value
Functioning method is stipulated in ↗[P009] GWD2/ALD2 - Limit Value Definition 2.

[P008] GWD1/ALD1 - Limit Value Definition 1

Data type	Byte
Adjustment range interfaces & BA / multiplier	[0]...255 / 1

Stipulates the functioning method of the temperature limit values ↗[P004] GW 1/AL 1 - Limit Value 1 and ↗[P005] GW 2/AL 2 - Limit Value 2.

Combinations are possible as a setting value. The setting value results from the sum of the identifications.

With a setting value 7 (corresponds to the sum of the identifications 1, 2 and 4), the zone is checked for absolute ↗[P004] GW 1/AL 1 - Limit Value 1 . An alarm is output only in the case where the actual value has exceeded the temperature limit value once.
The setting value 0 defines the limit values 1 and 2 as relative limit value alarms.

Identification	Limit value	Functioning method
1	Limit value 1	Absolute temperature limit value (Otherwise: Relative temperature limit value).
2	Limit value 1	Calculation only if limit value is reached.
4	Limit value 1	Alarm when actual value > limit value (Otherwise: Alarm with actual value < limit value). Applies only for an absolute temperature limit value.
8	Limit value 1	Without function.
16	Limit Value 2	Absolute temperature limit value (Otherwise: Relative temperature limit value).
32	Limit Value 2	Calculation only if limit value is reached.
64	Limit Value 2	Alarm when actual value > limit value (Otherwise: Alarm with actual value < limit value). Applies only for an absolute temperature limit value.
128	Limit Value 2	Without Function.

[P009] GWD2/ALD2 - Limit Value Definition 2

Data type	Byte
Adjustment range interfaces & BA / multiplier	[0]...255 / 1

Functioning method of the temperature limit values ↗[P006] GW 3/AL 3 - Limit Value 3 and ↗[P007] GW 4/AL 4 - Limit Value 4

Combinations are possible as a setting value. The setting value results from the sum of the identifications.

With a setting value 112 (corresponds to the sum of the identifications 16, 32 and 64) the zone is checked for absolute ↗[P007] GW 4/AL 4 - Limit Value 4. An alarm is output only in the case where the actual value has exceeded the temperature limit value once.
The setting value 0 defines the limit values 3 and 4 as relative limit value alarms.

Identification	Limit value	Functioning method
1	Limit Value 3	Absolute temperature limit value (Otherwise: Relative temperature limit value).
2	Limit Value 3	Calculation only if limit value is reached.
4	Limit Value 3	Alarm when actual value > limit value (Otherwise: Alarm with actual value < limit value). Applies only for an absolute temperature limit value.
8	Limit Value 3	Without Function.
16	Limit Value 4	Absolute temperature limit value (Otherwise: Relative temperature limit value).
32	Limit Value 4	Calculation only if limit value is reached.
64	Limit Value 4	Alarm when actual value > limit value (Otherwise: Alarm with actual value < limit value). Applies only for an absolute temperature limit value.
128	Limit Value 4	Without Function.

[P043] ALK1/ALC1 - Cooling Alarm Output 1

Data type Byte
Adjustment range interfaces & BA / multiplier [0]...255 / 1

If the zone is configured as a two-point control zone (↗[P038] KHLG/COOL - 3-Point Operation = off) the control output cooling can be used as an alarm output.
The functioning method of the alarm output is defined together with ↗[P044] ALK2/ALC2 - Cooling Alarm Output 2

Combinations are possible as a setting value. The setting value results from the sum of the identifications.

With a setting value 112 (corresponds to the sum of the identifications 16, 32 and 64) the zone is checked for absolute ↗[P007] GW 4/AL 4 - Limit Value 4. An alarm is output only in the case where the actual value has exceeded the temperature limit value once.
The setting value 0 defines the limit values 3 and 4 as relative limit value alarms.

Identification	Alarm cause
1	Current fault in case of "Heating Off"
2	Current fault in case of "Heating On"
4	Limit value 1
8	Limit Value 2
16	Limit Value 3
32	Limit Value 4
64	Sensor short-circuit
128	Sensor break/sensor incorrect polarity

[P044] ALK2/ALC2 - Cooling Alarm Output 2

Data type Byte
Adjustment range interfaces & BA / multiplier [0]...255 / 1

Identification	Alarm cause
1	Zone in identification phase
2	Actual value greater than maximum setpoint value/measuring range end value
4	Without function
8	Without function
16	Without function
32	Group interrupt alarm for entire control system
64	Group interrupt alarm for the zone block in which the zones are located
128	Alarm low active (Otherwise: Alarm high active)

↗[P043] ALK1/ALC1 - Cooling Alarm Output 1

[P051] ALP1/ALP1 - Alarm Calculation 1 with Passive Zones

Data type Byte
Adjustment range interfaces & BA / multiplier [0]...255 / 1

Basically, no alarm is calculated for a passive zone.

Nevertheless, if an alarm should be monitored in case of a passive zone, this can be stipulated with the aid of the parameters ↗[P051] ALP1/ALP1 - Alarm Calculation 1 with Passive Zones and ↗[P052] ALP2/ALP2 - Alarm Calculation 2 with Passive Zones.

Identification	Alarm cause
1	Current fault in case of "Heating Off"
2	Current fault in case of "Heating On"
4	Limit value 1
8	Limit Value 2
16	Limit Value 3
32	Limit Value 4
64	Sensor short-circuit
128	Sensor break/sensor incorrect polarity

↗[P052] ALP2/ALP2 - Alarm Calculation 2 with Passive Zones

[P052] ALP2/ALP2 - Alarm Calculation 2 with Passive Zones

Data type Byte

Adjustment range interfaces & BA / multiplier [0]...255 / 1

Identification	Alarm cause
1	Without function
2	Actual value greater than maximum setpoint value/measuring range end value
4	Without function
8	Without function
16	Without function
32	Without function
6 4	Without function
128	Without function

↗[P051] ALP1/ALP1 - Alarm Calculation 1 with Passive Zones

[SP08] A1D1/A1D1 - Definition Byte 1 - Alarm Output 1

Data type Byte

Adjustment range interfaces & BA / multiplier [0]...255 / 1

Together with ↗[SP09] A1D2/A1D2 - Definition Byte 2 - Alarm Output 1 and ↗[SP10] A1D3/A1D3 - Definition Byte 3 - Alarm Output 1 the functioning method of the alarm output AL1 is defined.

Combinations are possible as a setting value. The setting value results from the sum of the identifications.

With a setting value A1D1 = 12 (corresponds to the sum of the identifications 4 and 8), A1D2 = 0 and A1D3 = 80 (corresponds to the sum of the identifications 64 and 16) an alarm is output on the alarm output AL1 if the temperature exceeds the limit value 1 and the limit value 2. The alarm signal is stored and can be reset-acknowledged.

Identification	Alarm cause
1	Current fault in case of "Heating Off"
2	Current fault in case of "Heating On"

Identification	Alarm cause
4	Limit value 1
8	Limit Value 2
16	Limit Value 3
32	Limit Value 4
64	Sensor short-circuit
128	Sensor break/sensor incorrect polarity

[SP09] A1D2/A1D2 - Definition Byte 2 - Alarm Output 1

Data type Byte

Adjustment range interfaces & BA / multiplier [0]...255 / 1

Identification	Alarm cause
1	Zone in identification phase
2	Actual value greater than maximum setpoint value/measuring range end value
4	Without function
8	Without function
16	Without function
32	Without function
64	Without function
128	Without function

↗[SP08] A1D1/A1D1 - Definition Byte 1 - Alarm Output 1

[SP10] A1D3/A1D3 - Definition Byte 3 - Alarm Output 1

Data type Byte

Adjustment range interfaces & BA / multiplier [0]...255 / 1

Identification	Alarm cause
1	Error CAN
2	Profibus DP fault
4	CAN: Controller in the pre-operational mode
8	System error/channel data error (ERR)
16	Alarm status/alarm output storing
32	Alarm output low active (otherwise: Alarm output high active)
64	Alarm output resettable (in case of alarm status/alarm output storing): Alarm is not output before until danger signal is newly present.
128	Without function

↗[SP08] A1D1/A1D1 - Definition Byte 1 - Alarm Output 1

[SP11] A2D1/A2D1 - Definition Byte 1 - Alarm Output 2

Data type Byte

Adjustment range interfaces & BA / multiplier [0]...255 / 1

Stipulates the functioning method of the alarm output 2.

↗[SP08] A1D1/A1D1 - Definition Byte 1 - Alarm Output 1

[SP12] A2D2/A2D2 - Definition Byte 2 - Alarm Output 2

Data type Byte

Adjustment range interfaces & BA / multiplier [0]...255 / 1

Stipulates the functioning method of the alarm output 2.
↗[SP09] A1D2/A1D2 - Definition Byte 2 - Alarm Output 1

[SP13] A2D3/A2D3 - Definition Byte 3 - Alarm Output 2

Data type Byte

Adjustment range interfaces & BA / multiplier [0]...255 / 1

Stipulates the functioning method of the alarm output 2.
↗[SP10] A1D3/A1D3 - Definition Byte 3 - Alarm Output 1

[SP14] A3D1/A3D1 - Definition Byte 1 - Alarm Output 3

Data type Byte

Adjustment range interfaces & BA / multiplier [0]...255

Stipulates the functioning method of the alarm output 3.
↗[SP08] A1D1/A1D1 - Definition Byte 1 - Alarm Output 1

[SP15] A3D2/A3D2 - Definition Byte 2 - Alarm Output 3

Data type Byte

Adjustment range interfaces & BA / multiplier [0]...255

Stipulates the functioning method of the alarm output 3.
↗[SP09] A1D2/A1D2 - Definition Byte 2 - Alarm Output 1

[SP16] A3D3/A3D3 - Definition Byte 3 - Alarm Output 3

Data type Byte

Adjustment range interfaces & BA / multiplier [0]...255 / 1

Stipulates the functioning method of the alarm output 3.
↗[SP10] A1D3/A1D3 - Definition Byte 3 - Alarm Output 1

9.8 Heating Current Monitoring

A monitoring of the heating current enables the secure and early identification of the following faults:

- Insulation damage and/or partial failures of heaters
- Total loss of a heater of a group connected in parallel e.g. at the hot-channel distribution column or at the extrusion tool.
- Failures of individual control zones,
- For example, through defective heater, triggered protection interrupt or defective power circuit-breaker.
- Shorts on the power circuit-breakers (solid-state relay, TRIAC's, relay, contactor)

The measurement of the heating currents is implemented in a fixed time raster. The error messages are calculated after every measurement. For the avoidance of nuisance alarms through faulty measurements, the appropriate measurement is repeated with identification of a fault immediately and repeatedly before an alarm signal of the controller is output.

In this case the two following error types are distinguished between:

(a) Tolerance alarm (SAE-Alarm)

An alarm is output only if the measured current is located outside of the defined tolerance. This alarm is usually only evaluated as a prior warning.

(b) Current alarm with "switched off heating" (SAA-Alarm)

Short-circuits, "sticking" contactors and/or "alloyed" sound-state relays are causes for this alarm. Since, in this case, the heaters heat with full power, this alarm must be considered as a "critical alarm" which e.g. has as consequence a machine stop.

[P010] ATOL/AMPT - Current Tolerance

Data type	Word
Adjustment range interfaces/ multiplier	0...[20]...6553.5% / 10
Adjustment range BA	0...[20]...100%

Stipulates a tolerance band around the ↗[P011] ASOL/AMPN - Current Setpoint Value. A current alarm in case of "heating on", i.e. is a current tolerance alarm is output when a heating current is measured outside of the tolerance range

```
Current actual value < x ASOL/AMPT (1 - (ATOL/100)) and
Current actual value > x ASOL/AMPT (1 + (ATOL/100)).
```

is measured

In case of a current setpoint value of ASOL/AMPN of 10 A and a current tolerance ATOL/AMPT = 20, a current alarm in case of "heating on"/current tolerance alarm is output with the following current values:

- Current actual value < 10 A x (1 - (20/100)) = 8 A
- Current actual value > 10 A x (1 + (20/100)) = 12 A

[P011] ASOL/AMPN - Current Setpoint Value

Data type	Integer
Adjustment range interfaces/ multiplier	[0.0]...6553.5 A / 10
Adjustment range BA	[0.0]...200.0 A

Comparative value for the heating current of the zone to be measured.

- The current setpoint value can be stipulated manually or

- be measured automatically by means of the current transfer function .

werden.

[Zone 046] AEND/AMPE - Current Range End Value

Data type	Word/10
Adjustment range interfaces/ multiplier	0...[100]...6553.5% / 10
Adjustment range BA	0...[100]...999%

Adaptation of the indicated current value to the measurement signal of the current transformer.

PSG standard current transformers provide a heating current proportional voltage of 42mVeff/A. This value meets the current range end value of 100%. In case of current transformers with other measured voltage, the indicated current value can be adapted.

Current transformer supplies 21 mVeff/A.
For adaptation of the display AEND/AMPE must be set to 200%.

For ↗[SP25] ADEF/AMPD - Heating Current Measurement Method individual current measurement, the current range end value can be set individually for each zone.

For ↗[SP25] ADEF/AMPD - Heating Current Measurement Method summation current measurement, the current range end value must be equal for all zones assigned to one and the same current transformer.

[P056] SUMW/NoTR - Allocation of Current Transformer

Data type	Byte
Adjustment range interfaces/ multiplier	[0]...255 / 1
Adjustment range BA	[0]...32

With summation current measurement, the setting value stipulates the current measurement input to which the current transformer(s) for the corresponding zone is (are) connected. The setting value 0 means that no current transformer is planned for the zone.

[SP25] ADEF/AMPD - Heating Current Measurement Method

Data type	Byte
Adjustment range interfaces/ multiplier	[0]...255 / 1
Adjustment range BA	[0]...15

Stipulates the measurement method of the heating current measurement.

0	Deactivated current monitoring
1	■ Without function.
2	Without function.
3	Without function.
4	Summation current measurement. ■ Degree of operation <= 0%: Display of the last measured current value in case of switched-off heating ■ Degree of operation <= 0% display of the last measured current value in case of switched-off heating
5	Summation current measurement. Display of the currently measured heating current value in case of switched-on heating
6	Summation current measurement. Display of the last measured current value in case of switched-off heating.
7	Without function.
8	Summation current measurement ■ Degree of operation > 0%: Display of the last measured current value in case of switched-off heating ■ Degree of operation <= 0% display of the last measured current value in case of switched-off heating. Measurement also at degree of operation = 0%.
9	Summation current measurement. Display of the currently measured heating current value in case of switched-on heating
10	Summation current measurement. Display of the last measured current value in case of switched-off heating.
11	Without function.
12	Summation current measurement ■ Degree of operation > 0%: Display of the last measured current value in case of switched-off heating ■ Degree of operation <= 0% display of the last measured current value in case of switched-off heating. In case of adjustment RELH = on.
13	Summation current measurement. Display of the currently measured heating current value in case of switched-on heating
14	Summation current measurement. Display of the last measured current value in case of switched-off heating.
15	Without function.

[SP34] MSAA/AMPM - Maximum Current Value with Measurement Heater Off

Data type	Byte
Adjustment range interfaces/ multiplier	0.0...[0.5]...25.5 A / 10
Adjustment range BA	0.1...[0.5]...2.0 A

Stipulates the limit value, above which with a current measurement a current alarm is output in case of "Heating Off". The measurement is implemented with measurement of the heating currents.

[SP35] SUW /VOLT - Allocation of Voltage Module

Data type	Byte

With the SUW module (is measured accompanying the measurement of the heating currents the mains voltage). With this value the heating currents are adapted to a standardized voltage of 400 V independently of line voltage fluctuations.

The SUW module is connected as a first module to the current input 1 of the CANSTI, II/CANSTI, II P associated with the controller. DIP switch 6 must be activated on the CANSTI.

9.9 Group functions

Every zone can be assigned to a group. For this, 24 groups are available. With the assistance of the groups, for example, event-controlled functional chains can be formed.

The group functions have controller-overall effect, if the controllers are connected with each other over CAN-Bus.

The group function is storing.

- It is carried out after reset of the control system
- after deactivation of the Digital Input 2 if the system parameter ↗[SP23] INP1/INP1 - Function Digital Input 1= 0 or 1 is set adjusted.

durchgeführt.

[P058] GPNr/GPNo - Group Number

Data type	Byte
Adjustment range interfaces & BA / multiplier	[0]...24 / 1

Assigns the control zone to a group with the group number.

Setting value = 0 means that the zone is not assigned to any group.

[P059] GPF /GPF - Group Release

Data type	Byte/1
Adjustment range interfaces & BA / multiplier	[0]...24 / 1

Stipulates the group from which a release is given.

Setting value = 0 means that the zone does not require any release from another group, i.e. the zone starts immediately.

[P060] GPM /GPM - Group Mode

Data type	Byte
Adjustment range interfaces	[0]...255 / 1

Stipulates the condition whereby the release group issues a release or defines the function that is implemented for all zones of a group.

0	Release, if in case of all zones of the release group [Actual value > (Setpoint value - GW-)]
1	Release, if in case of all zones of the release group [Actual value > FGW1/LVA1]
2	Release, if in case of all zones of the release group [Actual value > FGW2/LVA2]

3	Release, if in case of all zones of the release group [Actual value > FGW3/LVA3]
4	Release, if in case of all zones of the release group [Actual value > FGW4/LVA4]
5	A setpoint value of a group received over an interface is sent to all other zones.
10	As 0. After zone reset zone is heated up from the sloping setpoint value assuming.
11	As 1. After controller reset, zone is heated up starting from the sloping setpoint value.
12	As 2. After controller reset, zone is heated up starting from the sloping setpoint value.
13	As 3. After controller reset, zone is heated up starting from the sloping setpoint value.
14	As 4. After controller reset, zone is heated up starting from the sloping setpoint value.

[SP39] FGW1/LVA1 - Release Limit Value 1 (Group Mode)

Data type	Integer
Adjustment range interfaces/ multiplier	[0]...6553.5 Unit of the measurement input / 10
Adjustment range BA	[0]...999 Unit of the measurement input

Release limit value for the release group.

[SP40] FGW2/LVA2 - Release Limit Value 2 (Group Mode)

Data type	Integer
Adjustment range interfaces/ multiplier	[0]...6553.5 Unit of the measurement input / 10
Adjustment range BA	[0]...999 Unit of the measurement input

Release limit value for the release group.

[SP41] FGW3/LVA3 - Release Limit Value 3 (Group Mode)

Data type	Integer
Adjustment range interfaces/ multiplier	[0]...6553.5 Unit of the measurement input / 10
Adjustment range BA	[0]...999 Unit of the measurement input

Release limit value for the release group.

[SP42] FGW4/LVA4 - Release Limit Value 4 (Group Mode)

Data type	Integer
Adjustment range interfaces/ multiplier	[0]...6553.5 Unit of the measurement input / 10
Adjustment range BA	[0]...999 Unit of the measurement input

Release limit value for the release group.

9.10 Serial data interface

The description of the communication protocols, as well as the specification of the configuration parameters, is to be taken from the protocol descriptions and the parameter/object lists.

[SP01] PROT/PROT - Protocol

Data type	Char
Adjustment range interfaces/ multiplier	[0], 1, 2 / 1
Adjustment range BA	[PSG], rtU, HRS

Protocol for communication over serial data interface.

0	PSG II

1	MODBUS RTU
2	HRS: as PSG II. For operation in PSG control cabinets with PC operator interface.

[SP02] BAUD/BAUD - Baud Rate

Data type	Char
Adjustment range interfaces/ multiplier	0, 1, 2, 3, [4] / 1
Adjustment range BA	1200, 2400, 4800, 9600, [19.2]

[SP03] STOP/STOP - Number of Stop Bits

Data type	Char
Adjustment range interfaces & BA / multiplier	[1], 2 / 1

Number of the stop bits with communication over the serial data interface.

[SP04] PARI/PARI - Parity

Data type	Char
Adjustment range interfaces/ multiplier	[0], 1, 2 / 1
Adjustment range BA	[no], odd, even

Parity bit for communication over serial data interface.

[SP32] SADR/SADR - Software Address

Data type	Byte
Adjustment range interfaces/ multiplier	[0]...255 / 1
Adjustment range BA	[0]...31

Applies only in case of ↗[SP01] PROT/PROT - Protocol = PSG.
The address of the first 8 control zones can be stipulated flexibly over the software address.

- In case of setting value equal to 0, the switch position of the addressing DIP switches is employed for the addressing.
- In case of setting value greater than 0, the software address is employed for the addressing and the addressing DIP switches are without function. The software address defines the address of the first 8 control zones of the controller. The addresses of the further 8-zone blocks are sequential.

[SP33] ADRT/ADRT - Addressing Type

[0]	Controller always occupies 4 addresses; one address applies for 8 zones. The address of the first 8 zones ■ is equal to the ↗[SP32] SADR/SADR - Software Address, if this is adjusted greater than 0 ■ is calculated from the setting of the addressing DIP switches: Address of the first 8 zones = DIP switch value x 4 if ↗[SP32] SADR/SADR - Software Addressis equal to 0 The addressing of the following 8x zone blocks is sequential.
1	Function identical with setting value 0.
2	One address applies for all zones of the controller. The address ■ is equal to the ↗[SP32] SADR/SADR - Software Address, if this is adjusted greater than 0 ■ is calculated from the setting of the addressing DIP switches: Address of all zones = DIP switch value x 1 if ↗[SP32] SADR/SADR - Software Addressis equal to 0
3	Function identical with setting value 0, but address of the first 8 zones = DIP switch value x 1.

[SP37] MADR/MADR - Modbus Base Address

Data type	Byte
Adjustment range interfaces & BA / multiplier	0...[32]...255 / 1

Valid only in case of ↗[SP01] PROT/PROT - Protocol = rtu.

Determines the address. Stipulates the Modbus address of the first zone of the controller. The MODBUS addresses of the following controller zones are sequential.

9.11 CANBUS

The description of the communication protocol, as well as the stipulation of the configuration parameters, are to be taken from the protocol description and the parameter/object list.

[SP05] CADR/CADR - CANopen Base Address

Data type	Char
Adjustment range interfaces & BA	0...[32]...127 / 1

CAN-Bus address of the controller = CADR/CADR + Device ID

↗Addressing and Further Functions by DIP Switch

[SP06] A-OP/A-OP - Auto-Operational Mode CANopen

Data type	Bit
Adjustment range interfaces	0, [1]
Adjustment range BA	off, [on]

0	off	The components on the CAN-Bus are provided with the "Auto-operational" command from a CANopen Master.
[1]	[on]	The controller, as well as that relevant CAN peripheral components, are functional in CAN-open operation, also without CAN-open masters. For this, the controller sends the "Auto-operational Mode On" command.

[SP45] CANT/CANT - Timeout CAN (Zone off)

Data type	Byte
Adjustment range interfaces/ multiplier	[0]...255 seconds / 1
Adjustment range BA	[0]...120 seconds

Specifies the time within which communication over the CAN-Bus must occur. If no communication is determined, no actuating signal is output to the control outputs.

Setting value = 0 deactivates the function.

9.12 Profibus DP

The description of the communication protocols, as well as the specification of the configuration parameters, is to be taken from the protocol descriptions and the parameter/object lists.

[SP07] DPAD/DPAD - Profibus DP Slave Address

Data type	Byte
Adjustment range interfaces & BA / multiplier	0...[30]...255 / 1

Profibus address of the controller = DPAD/DPAD + Device ID

↗Addressing and Further Functions by DIP Switch

[SP43] DP-T/DP-T - Timeout DP (Zone OFF)

Data type	Byte/1
Adjustment range interfaces/ multiplier	[0]...255 seconds / 1
Adjustment range BA	[0]...120 seconds

Stipulates the time within which communication over the CAN Bus must occur. If no communication is determined, no actuating signal is output to the control outputs.
Setting value = 0 deactivates the function.

[SP44] DPEA/DPEA - Profibus DPEA Protocol

Data type	Bit
Adjustment range interfaces/ multiplier	[0]/1
Adjustment range BA	[off]/on

Specifies the protocol, that is communicated over the Profibus.

9.13 Ethernet

The description of the communication protocols, as well as the specification of the configuration parameters, is to be taken from the protocol descriptions and the parameter/object lists.

[SP46] IP1 /IP1 - IP Address of 1st Octet

Data type	Byte
Adjustment range interfaces & BA / multiplier	0...[192]...255 / 1

First octet of the Device IP (**XXX**.XXX.XXX.XXX).

[SP47] IP2 /IP2 - IP Address of 2nd Octet

Data type	Byte
Adjustment range interfaces & BA / multiplier	0...[168]...255 / 1

Second octet of the Device IP (XXX.**XXX**.XXX.XXX).

[SP48] IP3 /IP3 - IP Address of 3rd Octet

Data type	Byte
Adjustment range interfaces & BA / multiplier	0...[0]...255 / 1

Third octet of the Device IP (XXX.XXX.**XXX**.XXX).

[SP49] IP4 /IP4 - IP Address of 4th Octet

Data type	Byte
Adjustment range interfaces & BA / multiplier	0...[200]...255 / 1

Base IP of the fourth octet of the Device IP.
`IP of the controller = IP1.IP2.IP3.IP4+Device-ID`

↗Addressing and Further Functions by DIP Switch

[SP50] SUB1/SUB1 - Subnet mask of 1st Octet

Data type	Byte
Adjustment range interfaces & BA / multiplier	0...[255] / 1

First octet of the Device Subnet mask (**XXX**.XXX.XXX.XXX).

[SP51] SUB2/SUB2 - Subnet mask of 2nd Octet

Data type	Byte
Adjustment range interfaces & BA / multiplier	0...[255] / 1

Second octet of the Device Subnet mask (XXX.**XXX**.XXX.XXX).

[SP52] SUB3/SUB3 - Subnet mask of 3rd Octet

Data type	Byte
Adjustment range interfaces & BA / multiplier	0...[255] / 1

Third octet of the Device Subnet mask (XXX.XXX.**XXX**.XXX).

[SP53] SUB4/SUB4 - Subnet mask of 4th Octet

Data type	Byte
Adjustment range interfaces & BA / multiplier	[0]...255 / 1

Fourth octet of the Device IP (XXX.XXX.XXX.**XXX**).

9.13.1 Change IP setting

Start WinKonVis and attach a project with a net-controller.

Set DIP switch 1...5 to ON in register Info > Communication. Do the same setting for the controller. Independent from the existing IP in the controller, the standard IP 192.168.0.200 is used now. For the communication with the controller, the network settings, the IP, of the PC, where WinKonVis is running, has to be adjusted to the address range (fix IP address 192.169.0.*, subnet mask 255.255.255.0).

Set the desired IP in the system parameters ↗[SP46] IP1 /IP1 - IP Address of 1st Octet to ↗[SP49] IP4 /IP4 - IP Address of 4th Octet. Write the data to the controller.

Set DIP switch in register Info > Communication and on the controller as desired. Now the IP set under SP46 to SP49 is used for communication dependent on the DIP switch setting.

9.14 Gateway

Instead of converting protocols, the default gateway in an IP configuration does route not subnet relevant network requests to another subnet and fulfills therewith the function of a router (from software version 7X2910A inclusive).

[SP61] GWY1/GWY1 Gateway 1

Data type	Unsigned Char
Adjustment range interfaces	0...[192]...255
Unit	n.a.

First octet of the gateway address (**XXX**.XXX.XXX.XXX).

[SP62] GWY2/GWY2 Gateway 2

Data type	Unsigned Char
Adjustment range interfaces	0...[168]...255
Unit	n.a.

Second octet of the gateway address (XXX.**XXX**.XXX.XXX).

[SP63] GWY3/GWY3 Gateway 3

Data type	Unsigned Char
Adjustment range interfaces	[0]...255
Unit	n.a.

Third octet of the gateway address (XXX.XXX.**XXX**.XXX).

[SP64] GWY4/GWY4 Gateway 4

Data type	Unsigned Char
Adjustment range interfaces	0...[1]...255
Unit	n.a.

Fourth octet of the gateway address (XXX.XXX.XXX.**XXX**).

9.15 Representation of operating/visual display units BA

[SP17] DISP/DISP - Display in Case of Passivated Zone (BA)

Data type	Bit
Adjustment range interfaces	[0], 1
Adjustment range BA	[off], on

[0]	[off]	The zone displays of passivated zones are faded out.
1	on	The zone displays are represented also in case of passivated zones.

[SP27] ASTB/DIS% - Display in Manual Mode(BA)

Data type	Bit
Adjustment range interfaces	[0], 1
Adjustment range BA	[off], on

If manual mode activates...

[0]	Actu-al	Display of the actual values in the zone displays.
1	StL	Display of the setting levels in the zone displays.

[SP36] SPRA/LANG - Language (BA)

Data type	Byte
Adjustment range interfaces/ multiplier	[0], 1 / 1
Adjustment range BA	[off], on

Display of the short codes in the information display, as well as that status/error report in the zone displays in ...

[0]	German
1	English

9.16 Other parameters

[P036] APPL/APPL - Application

Data type	Byte
Adjustment range interfaces & BA / multiplier	[0]...255 / 1

By means of the applications parameter, extended customer-specific functions or adaptations to pre-determined applications can be connected to the standard functions.

0	Interruption of the identification phase 30 minutes	For zones without heating current monitoring. Interrupt criterion for identification algorithm, if e.g. power setting unit is disconnected, through which no temperature rise is implemented and faulty control system parameters were calculated.
1	Interruption of the identification phase 4 minutes	See setting value 0
2	Interruption of the identification phase 30 minutes	See setting value 0
3	Customer-specific function	
4	Hot air	Regulation optimizes configured for hot air application.
5	Minimum current measured value 0.1 A	
6	Without function	
7	Customer-specific function	
8	Without function	
9	Customer-specific function	
10	Customer-specific function	
11	Customer-specific function	

By the Bit 7 of parameter APPL/APPL the scaling of the actual values (standard signal input U/I direct on controller, and/or external by CAN) is managed (↗[P047] ANZ-/RG L - Lower Temperature Level at Standard Signal Inputs, ↗[P048] ANZ+/RG - Upper Temperature Level with Standard Signal Inputs).

10 Functions

10.1 MultiMedia Card MMC

The controllers of the design series sysTemp® net can be optionally equipped with a slot for a MultiMedia Card MMC. With the memory card, the following functions are usable:

- Firmware updates (duration approx. 50-60 seconds),
- Direct loading and storage of 10 controller settings (duration approx. 40 seconds each).
- Direct loading and storage of 10 DIP switches dependent controller setting adjustments (duration approx. 40 seconds each).
- Transfer of WinKonVis projects from the MMC into the controller.
- Project-oriented input of controller configurations on MMC in the WinKonVis format.
- Project-oriented writing of controller configurations of MMC.
- Representation of HTML pages stored on the MMC, with which a direct access to process and configuration data of the controller is possible (function can be used only in case of controllers with Ethernet interface).

Prerequisites for the use of the MMC are:

- Card type MMC (MultiMedia Card).
- Formatting of the MMC with FAT16 file system.
  - FAT16 supports cards up to 1 GB.
  - Larger cards can possibly be formatted by FAT16. The controller can then only access a storage range of 1 GB.
- Only file names of format 8.3 are supported.

The following are not supported:

- SD Cards
- Long file names

10.1.1Handling

The MMC is to be inserted into the slot so that the arrow on the MMC points downwards and/or the trimmed corner points upwards. After inserting, the MMC-LED lights up shortly.

Figure 10-1 Insert MMC into slot on the controller

Some of the functions are started immediately after inserting the card. Therefore it is absolutely necessary to consider the following references first.

10.1.2Formatting

The MMC's must be formatted with the FAT file system. MMC's formatted with FAT32 are not identified by the controller. The formatting can for example be done with the aid of a card reader on a PC with MSWindows.

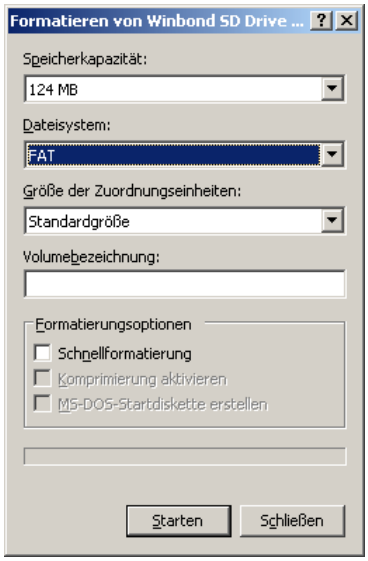


Figure 10-2 Formatting of the MMC with FAT file system

The formatting of the MMC can directly be executed by the entry of code number 93 on the controller alternatively. ↗Code numbers can directly be entered by operating an d display unit BA or by WinKonVis. However, the command for the input of a code number is also available in every interface protocol. In case of formatting over Code Number 93, the default file structure is additionally attached on the MMC.

10.1.3Default file structure and default file names

The following minimum file structure must be attached on the MMC.

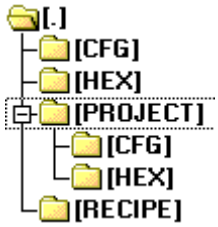


Figure 10-3 File structure

Folder		File	Description
		SYSTEM.CFG	Specifications of the file structure (optional)
		Various files with extension ALD	Autoload files (optional). With the aid of the files it is controlled whether and how firmware updates are implemented after the switching on (see chap. 10.1.4 “Autoload files”).
HEX		ETR132N.HEX ETS132N.HEX ETR112N.HEX	Firmware for the ETR132net Firmware for the ETS132net Firmware for the ETR112net
RECIPE		RCP_0.EXP … RCP_9.EXP	10 controller adjustments, which can be secured by the controller on the MMC over the code number commands 60...69. The file format is identical with the export/import file format from WinKonVis.

Folder		File	Description
CFG		CFG_0.EXP … CFG_9.EXP	10 controller adjustments, which can be secured by the controller on the MMC over the code number command 80 dependent on the DIP switch position. The file format is identical with the export/import file format from WinKonVis.
PROJECT		PROJECT.PSG	Project file Can be generated in WinKonVis from a project (Description in chapter ↗Generate MMC project from WinKonVis project).
	HEX		Folder for the firmware files for the project corresponding controller.
	CFG		Folder for the configuration files for the project corresponding controller.

The configuration of the default file structure and the default file names is done in the file SYSTEM.CFG This is a text file with the following syntax:

```
#PATH_REZEPTE="Path/ Folder for the storage and/or loading of the recipes"
#PATH CFG="Path/Folder for the storage and/or loading of the configurations"
#FILE_ETR132NET="Path + Filename of the firmware for the ETR132NET"
#FILE_ETS132NET="Path + Filename of the firmware for the ETS132NET"
#FILE_ETR112NET="Path + Filename of the firmware for the ETR112NET"
#FILE_PROJECT="Path + Filename of the project file"
```

If the file SYSTEMP.CFG is not existing on the MMC or if entries are missing in this or if it contains faulty entries, the default setting adjustments are then employed.

(Corresponds to the default settings)

```
#PATH_REZEPTE="RCP" #PATH_CFG="CFG"
#PATH_CFG="CFG"
#FILE_ETR132NET="HEX\ETR132N.HEX"
#FILE_ETS132NET="HEX\ETS132N.HEX"
#FILE_ETR112NET="HEX\ETR112N.HEX"
#FILE_PROJECT="PROJECT\PROJECT.PSG"
```

10.1.4Autoload files

The autoload files which are filed in the root directory (.ALD) are used for the automatic control of the firmware updates of the controllers of MMC. ALD files can (among other things) be generated manually with a text editor or attached on the MMC through input of a pre-determined code number (↗Code number for the control of the MMC functions).

The content of the autoload files is without importance in this case. A 0-byte file is sufficient so that an action is implemented. An exception is the file DEFINED.ALD. In this case it involves a text file in which the path and file name of the hex file to be loaded (e.g.PROJECT\HEX\ETR132N.HEX) are indicated.

Autoload files (except for the file PROJECT.ALD) are processed exclusively after the switching-on/reset of the controller. If the controller identifies after the switching-on that an autoload file is existing in the root directory of the MMC, then it implements the corresponding firmware update automatically.

The autoload file PROJECT.ALD is also processed in on-going operation (↗Function Project Files) in case of in-

File name	Function / Action after reset of the controller	File is deleted automatically
HEX.ALD	Controller type (ETR112, ETS132, ETR132, FIN32) is determined. If one of the above controller types is identified, the relevant firmware is loaded into the flash and started. If no controller type is identified (controller does not have any firmware), the firmware is not updated.	Yes (One-time loading process of the HEX)
ETR_132.ALD	Firmware of the ETR132 is loaded into the flash and started.	Yes (one-time loading process)
ETS_132.ALD	Firmware of the ETS132 is loaded into the flash and started.	Yes (one-time loading process)
ETR_112.ALD	Firmware of the ETR112 is loaded into the flash and started.	Yes (one-time loading process)
DEFINED.ALD	Firmware according to the specifications in DEFINED.ALD is loaded into the flash and started.	Yes (one-time loading process)
ALWAYS.ALD	Controller type (ETR112, ETS132, ETR132) is determined with booting the controller. If one of the controller types is identified, the corresponding firmware is loaded into the flash and started. If no controller type is identified (no firmware in the controller), the firmware is not updated.	No (is always reloaded)
PROJECT.ALD	Autoload file with the highest priority. The actions defined in the currently valid project file are carried out (↗Function Project Files)	No (is always reloaded)
ALL_DIP.ALD	After a restart/reset of the controller and existent storage card is checked, whether the file ALL_DIP.ALD is available on the storage card and ALL DIP switches are set to ON. Next the recipe file RCP_0.EXP is loaded into the controller. The file ALL_DIP.ALD remains on the memory card, to enable to repeat this action again and again.	No (is always reloaded, when DIP switch is ON)

serting the MMC

10.1.4.1 Firmware update over autoload files

Sequence of a firmware update over autoload files

- Copy required autoload file into root directory from MMC.
- Controller is switched off. Plug MMC into the card slot. Switch on controller.
- Controller checks whether a firmware file is existing on the MMC under the indicated name and folder.
- Firmware file is transferred from the MMC into the RAM of the controller.
- Controller type is checked: if the controller types of the firmware contained in the flash of the controller and the firmware loaded into the RAM are different, then no firmware is programmed into the flash. Exception: No software is located in the flash.
- Comparison of the firmware versions in the flash and RAM. If these are identical, the firmware is not programmed into the flash. Otherwise, software is programmed from the RAM into the flash.

Controller software is newly started, controller implements reset.

Regulations and notes for the firmware update of the controller

- During the programming procedure, the supply voltage of the controller must not be switched off! (Software in the flash deleted)
- During the loading of the firmware, the MMC-LED lights up permanently.
- After successful loading process, this LED goes out and the software starts.

10.1.4.2 Error reports during the firmware update over autoload files

If a fault occurs during the firmware update over MMC the fault is signaled for approx.15 seconds at the end of the loading process with the assistance of the LED's.

Error report	OK-LED	SIO-LED	MMC-LED
Checksum error in the firmware file	flashes cyclical (period 0.5 sec) synchronous with SIO LED	flashes cyclical (period 0.5 sec) synchronous with OK LED	flashes cyclical quickly (period approx. 0.25 sec)
Fault during the opening of the firmware file/fault during the programming of the FLASH	flashes cyclical (period 0.5 sec) synchronous with SIO LED	flashes cyclical (period 0.5 sec) synchronous with OK LED	flashes cyclical slowly (period approx. 1.0 sec)

10.1.5Project file

One or more sysTemp® net temperature controllers are combined in a project (for example in controller units existing in systems/machines). Projects can be generated manually or with the export function of WinKonVis in the MMC format, with the corresponding directory structure and files. The directory structure of projects in the MMC format corresponds to that of the default project (file PROJECT.PSG, as well as the directories HEX and CFG). The project data are copied onto the MMC.

Several projects can be stored on the MMC. Every project is stored in a separate directory. The memory location of the currently valid project on the MMC is defined through the path specification #FILE_PROJECT in the file SYSTEM.CFG (root directory of the MMC). The number of the projects on the MMC is limited only through the memory capacity of the MMC.

10.1.5.1 Project file structure

With the project file PROJECT.PSG it is a question of a text file with LOAD instructions. These are built up as follows:

```
#LOAD DIP=x, HEX="Hexfile", CFG="Cfg-File", HEXALD=0/1, CFGALD=0/1
```

DIP = x	Instead of x the controller ID is entered alpha-numerically (corresponds to DIP switch setting) (0-31).
HEX = "…"	File name of the hex file for the corresponding controller.
CFG = "…"	File name of the configuration file for the corresponding controller.
HEXALD =	1 - Firmware update is automatically started after inserting the MMC. 0 - Firmware update is not automatically started after inserting the MMC.
CFGALD =	1 - Configuration data are transferred into the controller after inserting the MMC. 0 - Configuration data not transferred into the controller after inserting the MMC.

A project file with 4 controllers, for example, looks as follows:

```
#LOAD DIP=0, HEX="ETR132N.HEX", CFG="CFG0.EXP", HEXALD=0, CFGALD=0
#LOAD DIP=1, HEX="ETR112N.HEX", CFG="CFG1.EXP", HEXALD=1, CFGALD=1
#LOAD DIP=2, HEX="ETS132N.HEX", CFG="CFG2.EXP", HEXALD=1, CFGALD=1
#LOAD DIP=3, HEX="ETR132N.HEX", CFG="CFG3.EXP", HEXALD=1, CFGALD=1
```

10.1.5.2 Function Project Files

Project files are processed

- after reset of the controller
- after inserting of the MMC in case of on-going controller
- after input of the code number 82, 83 and 92.

abgearbeitet.

In all three cases, the controller checks whether the file PROJECT.ALD is existing in the root directory of the MMC. If the file is identified, the project indicated in SYSTEM.CFG is then set as a currently valid project.

After that, the controller checks in the file PROJECT.PSG whether the firmware auto-load function for the controller is activated. If it is, the corresponding firmware is loaded. After this, the switch HEXALD in the file PROJECT.PSG

is set to 0 automatically for the auto-load functions. Thus it is ensured that the firmware auto-load function is implemented only once. The original of the project file is additional backed up on the MMC with the extension .BAK.

After the update of the firmware, it is checked by the controller whether the configuration data should also be newly loaded from MMC onto the controller. If yes, the corresponding configuration is loaded automatically. After that, the switch CFGALD in the file PROJECT.PSG is automatically set to 0 for the auto-load functions. Thus it is ensured that the configuration data items are transferred into the controller one-time only. The original of the project file is additional backed up on the MMC with the extension .BAK.

10.1.6Code number for the control of the MMC functions

Code number	Function
60	Store current controller configuration (zone parameters, system parameters, model, attributes, Profibus) from controller onto the MMC in the recipe file RCP_0.EXP.
61	Store current controller configuration (zone parameters, system parameters, model, attributes, Profibus) from controller onto the MMC in the recipe file RCP_1.EXP.
62	Store current controller configuration (zone parameters, system parameters, model, attributes, Profibus) from controller onto the MMC in the recipe file RCP_2.EXP.
63	Store current controller configuration (zone parameters, system parameters, model, attributes, Profibus) from controller onto the MMC in the recipe file RCP_3.EXP.
64	Store current controller configuration (zone parameters, system parameters, model, attributes, Profibus) from controller onto the MMC in the recipe file RCP_4.EXP.
65	Store current controller configuration (zone parameters, system parameters, model, attributes, Profibus) from controller onto the MMC in the recipe file RCP_5.EXP.
66	Store current controller configuration (zone parameters, system parameters, model, attributes, Profibus) from controller onto the MMC in the recipe file RCP_6.EXP.
67	Store current controller configuration (zone parameters, system parameters, model, attributes, Profibus) from controller onto the MMC in the recipe file RCP_7.EXP.
68	Store current controller configuration (zone parameters, system parameters, model, attributes, Profibus) from controller onto the MMC in the recipe file RCP_8.EXP.
69	Store current controller configuration (zone parameters, system parameters, model, attributes, Profibus) from controller onto the MMC in the recipe file RCP_9.EXP.
70	Load controller configuration (zone parameters, system parameters, model, attributes, Profibus) from the MMC onto the controller in the recipe file RCP_0.EXP.
71	Load controller configuration (zone parameters, system parameters, model, attributes, Profibus) from the MMC onto the controller in the recipe file RCP_1.EXP.
72	Load controller configuration (zone parameters, system parameters, model, attributes, Profibus) from the MMC onto the controller in the recipe file RCP_2.EXP.
73	Load controller configuration (zone parameters, system parameters, model, attributes, Profibus) from the MMC onto the controller in the recipe file RCP_3.EXP.
74	Load controller configuration (zone parameters, system parameters, model, attributes, Profibus) from the MMC onto the controller in the recipe file RCP_4.EXP.
75	Load controller configuration (zone parameters, system parameters, model, attributes, Profibus) from the MMC onto the controller in the recipe file RCP_5.EXP.
76	Load controller configuration (zone parameters, system parameters, model, attributes, Profibus) from the MMC onto the controller in the recipe file RCP_6.EXP.
77	Load controller configuration (zone parameters, system parameters, model, attributes, Profibus) from the MMC onto the controller in the recipe file RCP_7.EXP.
78	Load controller configuration (zone parameters, system parameters, model, attributes, Profibus) from the MMC onto the controller in the recipe file RCP_8.EXP.
79	Load controller configuration (zone parameters, system parameters, model, attributes, Profibus) from the MMC onto the controller in the recipe file RCP_9.EXP.

Code number	Function
80	Load controller configuration (zone parameters, system parameters, model, attributes, Profibus) dependent on DIP switch from controller and store on in the configuration file MMC CFG_x.EXP (x= Addresses DIP switch position).
81	Load controller configuration (zone parameters, system parameters, model, attributes, Profibus) dependent on DIP switch from the configuration file CFG_x.EXP from MMC into the controller (x= Addresses DIP switch position). An existing file is overwritten directly.
82	Load controller configuration (zone parameters, system parameters, model, attributes, Profibus) according to the project file from controller and store on MMC. The old CFG file is backed up in this case as BAK file (see also chap.10.1.5 “Project file”)
83	Load controller configuration (zone parameters, system parameters, model, attributes, Profibus) according to the project file from MMC into the controller (see also chap.10.1.5 “Project file”)
90	Functional release MMC Before loading the firmware over code number or before formatting the MMC, a functional release must be implemented. If no further code number is entered after that within 20 seconds, then the functional release is canceled automatically again. With active functional release the message text "LdF" is output in the operating and display units BA and in the software tool WinKonVis. In addition, the mode is signaled over a cyclical flashing of the MMC-LED (frequency 1 Hz).
91	Update of the firmware is started. Prerequisite: Functional release activated. The hex file assigned to the controller type is loaded into the controller (see also chap.10.1.3 “Default file structure and default file names”)
92	Update of the firmware is started. Prerequisite: Functional release activated. The hex file defined in the project is loaded into the controller (see also chap.10.1.5 “Project file”)
93	Formatting the MMC card. Prerequisite: Functional release activated. With formatting, the default file names and the default file structure are attached.
94	Formatting of memory card. Prerequisite: Functional release activated (see code number 90) After formatting of the storage card the actual controller configuration is stored into the recipe file RCP_0.EXP on the storage card (see code number 60). In addition the file ALL_DIP.ALD is created.
99	Functional release cancellation MMC.

10.1.7Generate MMC project from WinKonVis project

From the WinKonVis Version 1.4.3.6 projects generated in WinKonVis can be converted directly into MMC-compatible projects with the aid of the export function. The exported project can be copied directly onto the MMC. Based on an existing project with a ETR132 net, a ETR112 net and a ETS132 net, the procedure is explained below step by step.

Attach and edit a WinKonVis project

A project is attached in WinKonVis consisting of the three controllers and stored in the directory E:\PROJEKT\WINKONVIS under the project name DEMO_WINKONVIS.

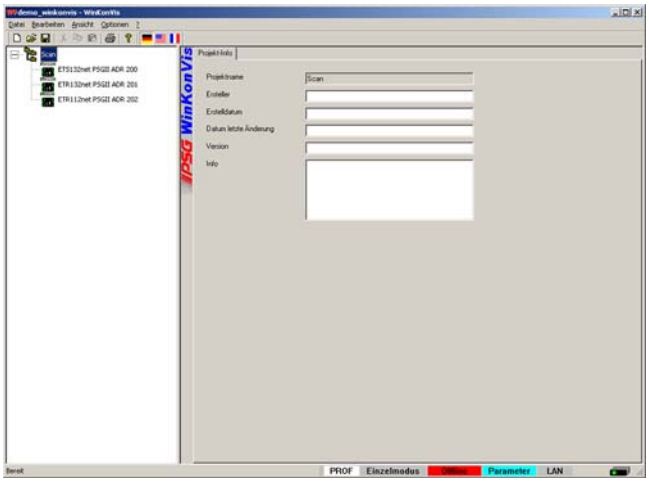


Figure 10-4 Attach WinKonVis project

Compiling information for MMC project

Call up the menu item File Export MMC Project. The following dialog window is opened.

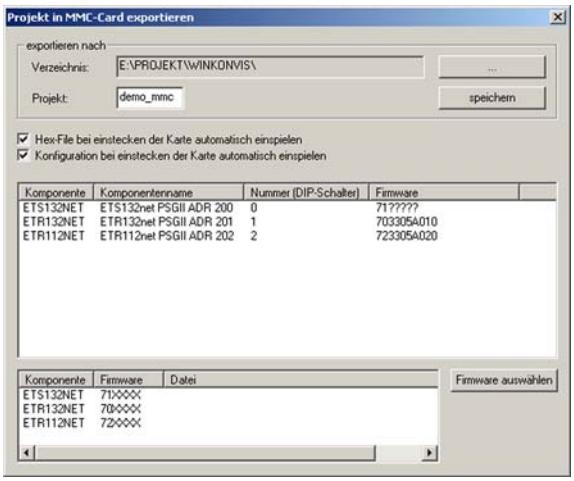


Figure 10-5 Dialogue window: Export MMC project before processing

In the dialog window the following stipulations are set for the MMC project:

- Memory location and name of the MMC project. The project name is limited to a maximum of 8 characters.
- Are firmware file and the configuration data loaded automatically with insertion of the MMC into the controller and/or after new start of the controller?
- The controllers of the WinKonVis project are listed in the component area.
- The firmware files, which are associated with the controllers in the WinKonVis project, are listed in the firmware area. These are stored in the MMC project. With call-up of the dialog box, no firmware files are yet assigned to the controller types. This is identifiable through the 'XXXX' identification in the firmware column. Using the firmware button, the firmware files are selected which are stored in the MMC project.

Store MMC project and copy onto MMC

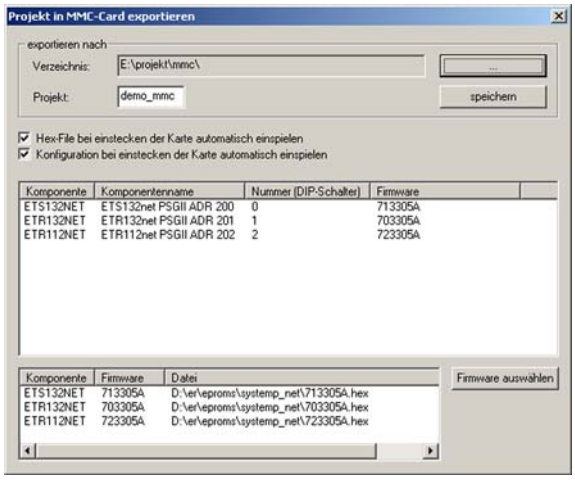


Figure 10-6 Dialog window: Export MMC project after processing

After stipulation of all data, the MMC project is stored, for example under the project name DEMO_MMC in the E:\PROJEKT\MMCdirectory.

The files of the MMC project are complete and can be copied directly onto the MMC.

- The configuration files SYSTEMP.CFG and PROJECT.ALD are located in the root directory of the project
- A directory with the project name of the MMC project is created (MMC project directory).
- The PROJECT.PSG, as well as two more subdirectories CFG and HEX, are located in the MMC project directory ↗Project file
- In the directory CFG is located one file per controller with the configuration data.
- The firmware files are located in the HEX directory.

10.1.8Managing several projects on the MMC

Several MMC projects can be secured on one MMC. It is unimportant whether the projects were generated manually or automatically with WinKonVis.

Every project is to be copied into a project directory. Using the path specification #FILE_PROJECT in the file SYSTEMP.CFG, which must be located in the root on the MMC, it is regulated which one of the projects is employed. For the automatic control, the control file PROJECT.ALD must also be located in the root directory of the MMC.

10.2 Code numbers

Behind code numbers are complex system-specific or process-specific functions, which simplify the handling of certain functions with the controller or which repair exception states in which the controller finds itself e.g. after faults or alarms.

Code numbers can be activated over all interfaces (see corresponding protocol descriptions) and the operating and visual display units.

DEC	HEX	Function	Information on the function
10	0A	Load setpoint value set 1 from EEPROM	
11	0B	Load setpoint value set 2 from EEPROM	
12	0C	Load setpoint value set 3 from EEPROM	
13	0D	Load setpoint value set 4 from EEPROM	
20	14	Write setpoint value set 1 to EEPROM	
21	15	Write setpoint value set 2 to EEPROM	
22	16	Write setpoint value set 3 to EEPROM	
23	17	Write setpoint value set 4 to EEPROM	
30	1E	Switch on °C	
31	1F	Switch on °F	
34	22	CANopen-Default-Init	
40	28	Resetting the temperature ramp	
41	29	Manual activation of a current measurement	↗Manual Activation of a Current Measurement (Code Number 41)
50	32	Connect heating outputs HRS-PC	
60	3C	Store recipe RCP_0.EXP	Function MMC
61	3D	Store recipe RCP_1.EXP	Function MMC
62	3E	Store recipe RCP_2.EXP	Function MMC
63	3F	Store recipe RCP_3.EXP	Function MMC
64	40	Store recipe RCP_4.EXP	Function MMC
65	41	Store recipe RCP_5.EXP	Function MMC
66	42	Store recipe RCP_6.EXP	Function MMC
67	43	Store recipe RCP_7.EXP	Function MMC
68	44	Store recipe RCP_8.EXP	Function MMC
69	45	Store recipe RCP_9.EXP	Function MMC
70	46	Load recipe RCP_0.EXP	Function MMC
71	47	Load recipe RCP_1.EXP	Function MMC
72	48	Load recipe RCP_2.EXP	Function MMC
73	49	Load recipe RCP_3.EXP	Function MMC
74	4A	Load recipe RCP_4.EXP	Function MMC
75	4B	Load recipe RCP_5.EXP	Function MMC
76	4C	Load recipe RCP_6.EXP	Function MMC
77	4D	Load recipe RCP_7.EXP	Function MMC
78	4E	Load recipe RCP_8.EXP	Function MMC
79	4F	Load recipe RCP_9.EXP	Function MMC
80	50	Store CFG dependent on the DIP switch	Function MMC
81	51	Load CFG dependent on the DIP switch	Function MMC
82	52	Store CFG into project	Function MMC

DEC	HEX	Function	Information on the function
83	53	Load CFG from project	Function MMC
90	5A	Activate firmware load mode (for 20 s)	Function MMC
91	5B	Load firmware	Function MMC
92	5C	Load HEX file from project	Function MMC
99	63	Reset firmware load mode	Function MMC
111	6F	Start automatic cooling adaptation	
112	70	Start zone-wise automatic cooling adaptation	For all zones, that should be adapted, set bit 0x08 in control byte for zone by interface. Code number 112 activates the cooling adaptation for the selected zones and resets bit.
177	B1	Start current transfer all zones	
200	C8	Switch on keylock	Operating and display unit function
201	C9	Switch off keylock	Operating and display unit function
440	1B8	Reset-acknowledge all alarms	
441	1B9	Reset-acknowledge Alarm Output 1	
442	1BA	Reset-acknowledge Alarm Output 2	
443	1BB	Reset-acknowledge Alarm Output 3	
501	1F5	Reset-acknowledge software reduction	
502	1F6	Block group release	↗Group functions
600	258	Start diagnostic function for sensor allocation	↗Diagnostic function (code number 600) - Allocation of Sensor and Heating
601	259	Start heating current diagnostics function	↗Diagnostic function (Code Number 601) - Start Current Measurement
602	25A	End diagnostic function and delete alarms	
759	2F7	Establish ex-works state and controller reset	
921	399	Profibus DPEA: Read in object list	
922	39A	Profibus DPEA: Write object list into the EEPROM	
985	3D9	Standard CPU matching	
998	3E6	Delete EEPROM write errors	
999	3E7	Reset control system	

10.3 Firmware update

The firmware of the controller is continuously undergoing further development. The controller is update-capable with the aid of the program WinKonVis (Art.No. 039020, executable from Microsoft Windows 98) over the serial interface and CAN und can be maintained at the latest software status after purchase. The controller firmware in the form of a file ("HEX- File") is clear of all charges.

WinKonVis is located, exactly as the controller firmware, either on the delivered CD-ROM or you can download it from the home page.

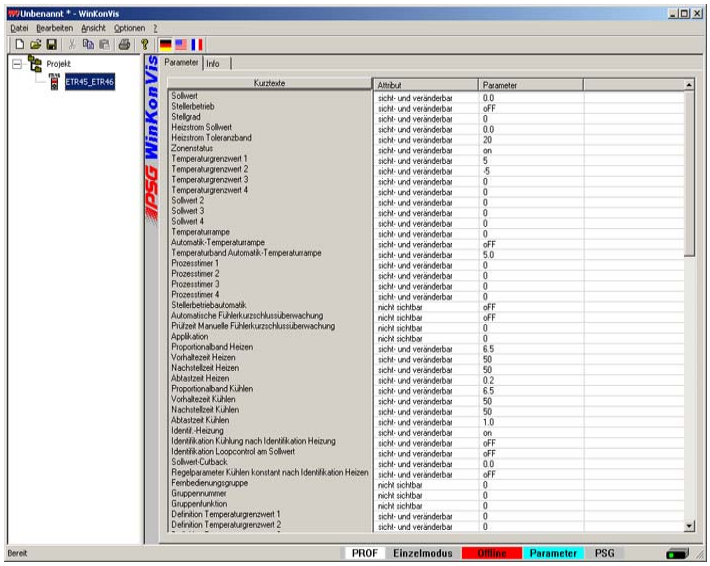
For the implementation of the update over the serial interface, the two interface converters SK232485 (Art. No. 039060, converter RS232-RS485) and SKUSB422 (Art. No. 039065, converter USB-RS485) are available as accessories, for the implementation of the update over CAN of the interface converters the interface converter SKUSBCAN is available (Art. No. 039065, converter USB-CAN).

Preparing update

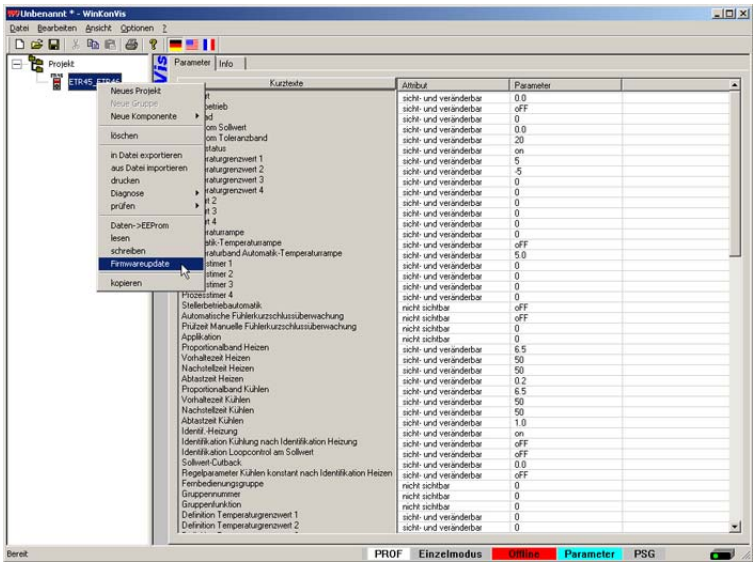
- WnKonVis must be installed and licensed.
- Optional: Install the driver of the USB-RS485 interface converter or the USB-CAN interface converter from the disk supplied.
- Ensure that the interface connection between PC and controller functions. For this, carry out an interface test under menu item Options/Interface/PSGII Options or Options/Interface/CAN Options or Options/Interface/LAN Options in WnKonVis). In case of interface functioning correctly, a version string is sent from the controller with the interface test, the fault counter is not counted up. In case of erroneous connection, the fault counter is counted up.

Carry out update

Start WinKonVis and attach a project with a net-controller. The controller address of the attached controller must be identical with the address of the controller with which the firmware update should be carried out.

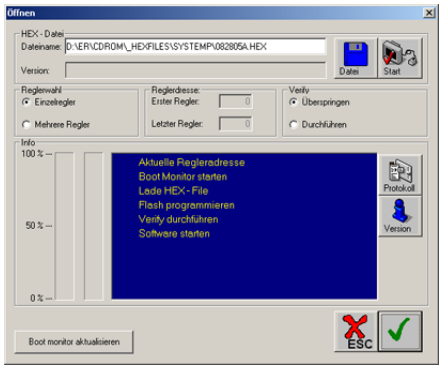


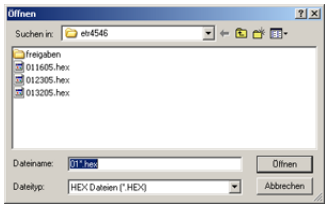
Click with right-hand mouse button on the controller in the left window. Select the firmware update menu item in the context menu.



In the update dialog window the HEX file of the update firmware must first be selected.

For this purpose, click on the button "File" and select the corresponding HEX file in the selection dialog box.

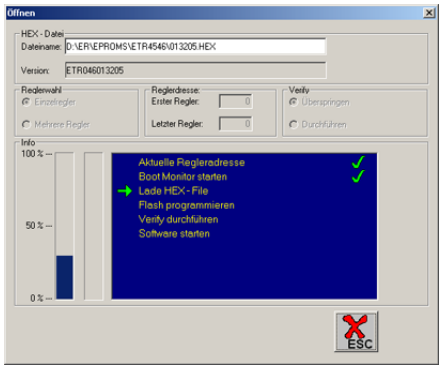




If the HEX file is damaged, then a warning appears. It is absolutely necessary to end the update procedure and provide a non-damaged HEX file.

Start firmware update through clicking on the button "Start".

A progress column displays the current status of the update procedure.



After successful firmware update, the controller is restarted. The dialog box can be closed.

11 Appendix

11.1 Version history

Version	Date	Changes
1.00.10	9/20/2013	In detail, the following amendments/corrections were made: ■ ERR 004 added ■ [P037] description adapted ■ Description [P050], [P046] specified ■ [P049] -99.9...0.0...99.9
1.00.09	10/31/2012	In detail, the following amendments/corrections were made: ■ SIO-LED added ■ Parameter SP61-SP63 added ■ Chapter IP change settings added ■ DIP6,7 ON 125k ■ ARMP leading zone -> reference zone ■ [P053] Factor 0.1 ■ Settings [P060] added
1.00.08	5/12/2010	In detail, the following amendments/corrections were made: ■ Temperature difference for [P041] ■ Diagnostic function by code number 600 and 601 added ■ Code number 41 amended
1.00.07	12/18/2009	In detail, the following amendments/corrections were made: ■ Default value IP4 (= 200) ■ Parameter ADRT revised, value 3 new; Device ID/Addressing PSGII with reference to ADRT ■ Zone parameters [P***], System parameters [SP**]
...	...	...
1.00.00	9/21/2006	First publication. Valid from controller software version 2406 A. PSG Plastic Service GmbH Pirnaer Straße 12-16 68309 Mannheim Germany Tel. +49 621 7162 0 Fax +49 621 7162 162 www.psg-online.de info@psg-online.de